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VIEWS, NEWS AND INTERVIEWS.

At the house of a well-known electrician, says London *Lightning*, some believers in spiritualism were spending an evening, during which one of them began to play the pianoforte accompaniment of a hymn sung at spiritualistic *séances*, when the room was mysteriously filled with a voice singing the words. Various other manifestations occurred, such as portraits singing in the natural voice of their living presentments when the animate originals were not in the room, mysterious replies to questions, and the correct number of "raps" in response to interrogations. Of course the table-rappers declared this to be one of the most remarkable spirit manifestations of which they had ever heard, and that it was enough in itself to convince any one of the genuineness of spiritualism. Their enthusiasm, however, suffered considerable abatement when it was pointed out that Collier telephone receivers, inside the piano and behind the pictures, were connected with a Brown loud-speaking transmitter in a distant part of the house. Another transmitter, fixed near the piano, was connected with a receiver at the ear of the distant "operating spirit," who was thereby enabled to keep time and tune, and to hear everything said in the room. Anyhow, it was a great compliment to the telephone, though perhaps not to the spirits. The raps were given by using the armature of an electric bell.

FIG. 1.—TELEPHONE SET AND WATER-TIGHT SWITCH-BOX, ELECTRIC RAILWAY TELEPHONE.

A writer in an Italian contemporary, according to the London *Electrical Review*, recently stated that, in the high voltage plant installed in Frankfort-on-Main, a workman was carrying out some repairs in the distribution system when he touched a bare copper wire while standing in good contact with the ground, and received a shock of about 2,900 volts. He immediately fell to the ground and remained for half an hour apparently dead. A bright spark was seen when he broke contact. Artificial respiration and throwing cold water on the breast gradually restored life, and he was able to resume work the next day.

Among the seven trades which a student in mechanical engineering must learn at Cornell is that of the blacksmith, says an exchange. Occasionally there is a protest, but it is never heeded. One dude 10 years ago was unusually averse to soiling his hands. But he had to work at the forge just the same. Last Fall he went to Professor Morris and thanked him for being compelled to learn blacksmithing. "Why?" asked the professor. "Why, you see," replied the former dude, "I am now superintendent of a mine away back in Colorado. Last Summer our main shaft broke, and there was no one in the mine but myself who could weld it. I didn't like the job, but I took off my coat and welded that shaft. It wasn't a pretty job, but she's running now. If I couldn't have done it, I'd have had to pack that shaft on mule back and send it 300 miles over the mountains to be fixed, and the mine would have shut down till it got back. My ability to mend that shaft raised me in the eyes of every man in the mine and the boss raised my salary."

The case of Brown *vs.* the New England Telephone and Telegraph Company, which was on trial before the superior court in Salem, Mass., recently, was settled out of court, the amount paid by defendant being about $500. Brown brought suit for personal injuries. He was riding on a street car to Salem Willows, and was struck by a telephone pole which stood out too far into the street.

FIG. 2.—METHOD OF USING ELECTRIC RAILWAY TELEPHONE.

TELEPHONE SERVICE ON ELECTRIC RAILWAYS.

THE SYSTEM INSTALLED BY THE NATIONAL TELEPHONE MANUFACTURING COMPANY, OF BOSTON, ON THE LINE OF THE BRAINTREE & WEYMOUTH ROAD—ITS CONSTRUCTION AND OPERATION.

The National Telephone Manufacturing Company, of Boston, have brought out a number of new devices in telephony of great value, and in several instances have demonstrated their ability to do things which have been pronounced utterly impractical by men who were supposed to be authority on the subject. These have been mentioned from time to time in the columns of the ELECTRICAL REVIEW, and in every instance have created a good deal of interest.

One of the latest installations of the National company is the single-wire system on the line of the Braintree & Weymouth Electric Road, which is now in operation, and from which splendid results have already been obtained. The construction is simplicity itself, and consists merely of a single No. 10 iron wire, although No. 12 hard-drawn copper is recommended, strung along the poles throughout the entire line, starting and ending in the power house, where the few cells of battery necessary for operating the relays are located. Connected with this wire at convenient distances are small water-tight switch boxes, as shown in the illustration herewith, fastened to the poles, within easy reach of the conductor when standing on the ground. Each car is provided with a small

portable combination receiver and transmitter, connected by a short cord to a contact plug, which fits into a slot in the bottom of the switch-box.

The whole portable outfit is no larger than a man's hand, and is hung up in one corner of the car. The idea for which the system is designed is to put every car on the road in direct and immediate connection with the power house or superintendent's office, so that in the event of accident or delay the conductor can telephone for assistance or instructions from any portion of the system.

The Braintree & Weymouth road is one peculiarly adapted to test the utility of the service, being a long, straggling line, running through several towns and outlying districts, and using 20 miles of wire in its circuit. In addition to this, there is probably no other road in the country where a telephone line would of necessity be operated under such trying conditions, and the fact that it operates at all speaks highly for the efficiency of the present system.

In the first place, the poles which carry the railway current also carry the electric light wires, and are decorated at short intervals by transformers, sometimes as many as three on a single pole, for the conversion of the alternating arc-light current. The stringing of these lighting wires, by the way, is about as poor a piece of work as could be found in a day's walk, and sooner or later will lead to a serious accident. The wires run through hundreds of trees along the route, to some of which they are fastened with insulators, but the majority

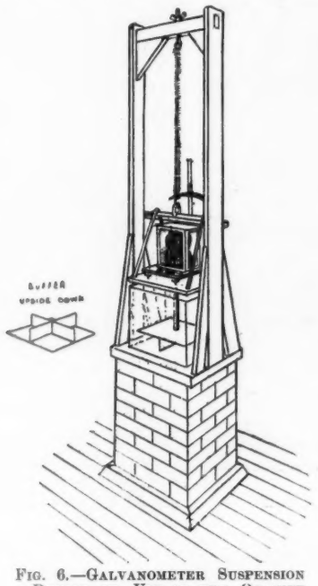

FIG. 6.—GALVANOMETER SUSPENSION DEVICE IN USE AT THE OKONITE FACTORY, PASSAIC, N. J.

are entirely without protection. Branches are constantly swaying against the wires and in places with sufficient force to chafe them badly.

The telephone line of necessity meets with the same conditions, and, aside from this, runs within a few feet of the railway feeder wires on the same poles. Any telephone man will appreciate the difficulties from static induction under such conditions, especially in wet weather. Yet, strange as it may seem, the operator at the superintendent's office states that the line never worked so smoothly and clearly as during the recent heavy storm. When it is remembered that induction coils are eliminated in the National instruments, the results obtained appear all the more remarkable.

The superintendent's office of the Braintree & Weymouth road is located in the car barn at Weymouth, and one of the little combination

FIG. 1.—INTERIOR VIEW OF BUSINESS OFFICES, PASSAIC, N. J., FACTORY OF THE OKONITE COMPANY, LIMITED.

receiver and transmitter telephones hangs within easy reach of his desk. With this in his hand he can communicate with every car on the road as well as with the power house, and is in every respect a well-equipped train dispatcher, with his entire system under control.

Your correspondent talked from here with the engineer in the power house, eight miles away, as easily as though he were in the same room,

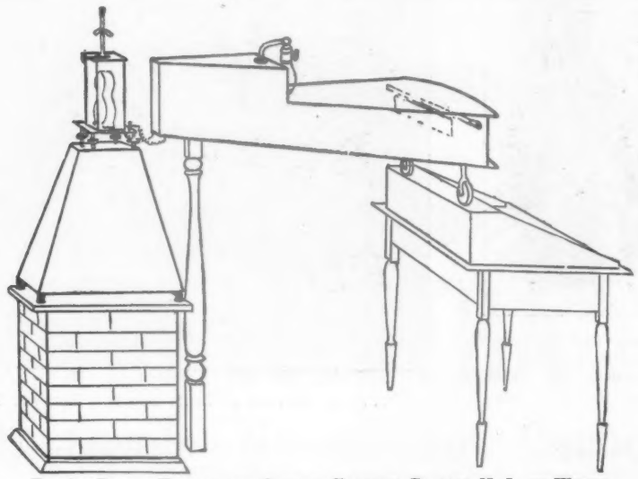

FIG. 5.—DEVICE USED AT THE OKONITE FACTORY, PASSAIC, N. J., BY WHICH ELECTRICAL TESTS ARE MADE IN A LIGHT ROOM.

and the sound of his voice in answer could be distinctly heard three feet from the receiver.

A peculiar little incident of the value of the service was related by the superintendent's clerk as having occurred during the last heavy snowstorm, just after the service was put in, and before a snowplow had been purchased.

One of the conductors on an early morning car forgot to take his instrument with him, and got stalled in a drift at the extreme end of the line, where other cars could not reach him. Nothing was heard from him, and he had to remain there the greater part of the day, until a relief force was sent to look him up, and he was dug out. If he had had his outfit with him, he could have made his situation known and had relief sent him immediately.

The mode of communication between a car on the line and the office of the superintendent is illustrated on page 15, the conductor talking from the terminus of the line at Braintree to the car barn at Weymouth, a distance of about four miles. In this case connection was made and an answer received within 30 seconds.

There is no complicated mechanism to carry about, no central station to be rung up, no wait for connections. The contact plug is inserted in the slot in the bottom of the switch-box, a slight pressure on the key in the handle of transmitter rings a bell in the office, and the line is open.

The uses to which a service of this kind can be put are many, and new advantages are brought out daily, as emergencies arise. The extreme simplicity of the installation makes the cost of construction merely nominal, and brings within the reach of every street railway line a device of great value in its operation, the cost of which has heretofore been prohibitive.

As well might a steam railway attempt to operate successfully without its telegraph as an electric road, especially a suburban one, without its telephone; and the prediction that the latter will soon be as well equipped in this respect as the former would not seem an idle one.

The National Telephone Company have done a good work in adapting this important branch of electricity to new lines, and their efforts are meeting with hearty appreciation.

H. G. T.

Boston, January 3, 1896.

Rheostats Made of Loose Graphite.

Dr. F. A. C. Perrine, professor of electrical engineering at Leland Stanford, Jr., University, Palo Alto, Cal., has recently been experimenting with rheostats made of loose graphite in the following manner:

An iron pipe about two inches in diameter and 12 inches long has a metal cap screwed on the bottom and is lined with plaster of Paris packed hard. It is then filled with common loose graphite. The movable terminal consists simply of a quarter-inch iron rod; such a rheostat being found to have a maximum resistance of about 100 ohms and to be able to absorb without overheating between 450 and 500 watts continuously. This rheostat presents many of the advantages of a water rheostat, while being more cleanly and susceptible to less variations of resistance, due to the formation of electrolytic salts in the water. Also, the specific resistance of the graphite being somewhat lower than that of the water, there is not so great a sudden decrease of resistance when the rheostat is short circuited. It has been found necessary to line the rheostat with a poor conductor in order to obtain a high total resistance, and it is also necessary to thoroughly dry the lining in order to avoid volcanic eruptions on account of the formation of steam when the lining is the least damp. Dr. Perrine states that this is in many ways the most satisfactory cheap absorber of power that he has been able to come across.

Zinc Smelters Combine.

Advices from St. Louis state that on January 1 a deal was closed which unites all the zinc smelters of the country practically under one management, and the result will be, the promoters assert, better prices for zinc in all branches and a general revival of the industry. The money involved is about $2,000,000, which is to be furnished by New York and Connecticut capitalists. The deal was engineered by B. F. Hobart, president of the Kansas & Texas Coal Company, which controls a big smelter at Pittsburg, Kas.

It has been found that the speaking tubes in use on English war ships do not work well on account of the rattling of the machinery. The Admiralty has decided to try telephones.

THE OKONITE COMPANY, LIMITED.

AN ILLUSTRATED DESCRIPTION OF THIS WELL KNOWN COMPANY'S IMMENSE WIRE MILLS AT PASSAIC, N. J.—A SPLENDIDLY EQUIPPED PLANT FOR THE MANUFACTURE OF INSULATED WIRE.

"Okonite" is a familiar word to every man even remotely connected with the electrical business. Wherever cables and wires are used, there the semicircular trade-mark is known, so that it may be said in truth that the sun never sets on Okonite. The growth of the Okonite Company, Limited, has been even more rapid and astonishing than many other electrical manufacturing companies. The elements of the company's success may be found in its intelligent and liberal management, the scrupulous and ever-watchful care exercised over its manufacturing department, the high and unvarying quality of its product and its brainy and broad methods of advertising. No firm in the electrical field has devoted more care and attention to its advertising, and few, if any, have spent more money than the Okonite Company to direct public attention to its wares. The results achieved after little more than 10 years' effort speak for themselves. To-day the company occupies an immense plant on the Dundee Canal, at Passaic, N. J., which is kept busy filling orders for Okonite products; its head business offices occupy a whole floor at 13 and 15 Park Row, New York city; and its agencies are located in London, Rome, Yokohama, Shanghai, Buenos Ayres, Chicago, Boston, St. Louis, San Francisco, Philadelphia, Omaha, Cincinnati, Kansas City, Pittsburgh and Buffalo.

The Okonite Company had its beginning in 1884, when J. J. C. Smith, Michael Smith and Herman Gelpcke organized the New York Insulated Wire and Vulcanite Company and established an experimental plant for the manufacture of insulated wire at College Point, Long Island. Here they began making a special form of insulation, which has since become so widely known as Okonite. In 1885 the name of the company was changed to the Okonite Company, and the plant was removed to Passaic, N. J. At this time the business was under the management of Chas. A. Cheever, Willard L. Candee and George T. Manson, and remained so until 1889, when it was reorganized under the name of the Okonite Company, Limited, with the present management, which is composed as follows: Willard L. Candee and H. Durant Cheever, managing directors; George T. Manson, general superintendent, and W. H. Hodgins, secretary.

In 1888 the present group of factory buildings at Passaic was commenced and each year since then the rapidly increasing business of the company has necessitated the erection of new buildings and improvements in the old ones. Recently the plant has been thoroughly overhauled, the machinery rearranged for more accurate and rapid work and new machinery added, until it now stands perfectly equipped for the production of any kind of insulated electrical conductor, from the fine silk-covered wire used for lamp cord to the heavy, iron-armored submarine cable.

A representative of the ELECTRICAL REVIEW recently spent a day in going over the Okonite plant in company with General Superintendent George T. Manson. The resulting impressions after the trip were the systematic arrangement of the various manufacturing departments, the immense capacity of the plant, the care and intelligent expert supervision exercised in the testing department and the extreme cleanliness observed in every step of making Okonite wire. The business offices are located on the second floor at the end of the main building. They are light and commodious and equipped with a long-distance telephone and other modern conveniences for the rapid transaction of business. In a separate building, 125x50 feet in extent, is located the supply department, which occupies two floors. This department is very complete in its arrangement and handles all raw material of every description used in the plant. Bare copper wire, iron wire, jute, yarn, belting, fittings and parts of machines are here arranged in order ready to be supplied on requisition in an instant. It is a veritable store, which sells the factory raw materials and buys them back again as finished products.

The most notable fact about the boiler room is the apparent absence of fuel for the furnaces under the four boilers of 100 horse-power each. Crude oil, stored in tanks outside the buildings to the amount of 60,000 gallons, is used for fuel. It is forced through pipes by pneumatic pressure to the furnace doors, and there it belches forth in torrid flames, which bring the furnaces lined with fire brick almost to a white heat.

In the engine room is a 250 horse-power engine and three smaller ones for driving dynamos. Water-power to the amount of 200 horse-power is also obtained from the Dundee Canal. There is a Thomson-Houston alternator which supplies current for a Thomson welder, used in joining

FIG. 2.—VIEWS IN THE PASSAIC, N. J., PLANT OF THE OKONITE COMPANY, LIMITED.—1. WINDING DEPARTMENT. 2. CALENDERING DEPARTMENT. 3. TESTING DEPARTMENT. 4. STORE ROOM.

lengths of wire, and also furnishes current to the testing department for the voltage tests. A Thomson-Houston 450-light direct-current machine furnishes the plant with light.

The New England Engineering Company, of Waterbury, Conn., A. M. Young, president, has just finished rewiring all the buildings and has installed a new switchboard and bank of transformers. Over 600 lights are now in service. When all are in use the alternating generator supplies a part of the current through transformers. The switchboard is composed of two slate panels carrying seven circuits and equipped with Weston instruments. It is so arranged that its capacity may be readily increased. Naturally the wire used in running the circuits is Okonite. It is all exposed and is carried on porcelain insulators throughout. The job is thoroughly up to date, and one that the New England Engineering Company should feel proud of.

The system of fire protection adopted is very complete. Every building is equipped with automatic sprinklers and at frequent intervals barrels of sand are placed. Many an incipient blaze may be quenched by a handful of sand that would only be aggravated and spread were water turned on it. This is especially true of burning oil or rubber. Every here and there throughout the plant are a hydrant, coil of hose and a fire axe ready for quick work when necessary.

A carpenter shop, machine shop and blacksmith shop occupy a building by themselves. Here all the wire and cable reels, packing cases and other wooden things are made, as well as all repairs. The company builds, from its own designs, a great many of its cabling, armoring and covering machines and a great deal of the special machinery employed in the plant. The largest cabling machine in use in the Okonite factory was built complete in this shop.

In making Okonite the finest obtainable quality of pure Para rubber is used. In the immense drying rooms, kept at the proper temperature by covered steam pipes laid along the floor, 50,000 pounds of rubber are kept hanging on the racks at all times. As fast as the rubber is used the stock is replenished. The rubber washing room has a cement floor and is as clean as a Dutch kitchen. It is fully equipped with washing tanks, grinders and other machinery, which breaks and crushes and kneads the rubber until every foreign substance is extracted.

When the bare copper wire is received it is carefully measured, gauged, tested for conductivity, cleansed, straightened and wound on reels preparatory to being tinned. After being run through the hot tinning baths, which have a capacity from No. 30 to No. 0000, the wire is cooled and then wound on reels again. After this it is taken to the machines which cover it with the Okonite compound. As it comes from the final process it is wound on steel reels for curing, and is then sent to the testing department. When the tests are finished the wire goes to the measuring department and is then placed in stock, finished with a plain insulation. It is now ready to ship or to go to the braiding, twisting, cabling or other departments as required. An interesting feature of the covering department is that all the machines are run by electric power supplied by a 30 horse-power "C. & C." motor. This motor has been steadily at work during every hour the plant has been in operation for two years and has never been stopped a minute for repairs. Near it stands an engine for use in emergencies, but it hasn't been called upon to do any work since the motor was installed.

The cable-making machinery in the Okonite plant is especially complete and that for the larger cables is very massive. An immense cable-testing tank is located just below the largest armoring machine, situated on the floor above it, and as the cable comes through the machine it runs down through a hole in the floor into the tank where the tests are made.

This matter of testing is regarded as of the greatest importance by the Okonite Company and their testing department is one of the most complete in the whole plant. Not a foot of Okonite wire or cable leaves the factory until it has successfully withstood tests many times as severe as would occur in actual practice. Upon receipt of the wire or cables in the testing department they are at once placed in tanks and kept immersed in water. For standard sizes, the general rule followed is for lamp cord and smaller conductors to immerse for 36 hours. Other sizes with a covering for standing the low-tension test of 1,000 volts remain in for 60 hours. Medium-tension wire, that is a covering which must stand 2,500 volts, must remain in from 60 to 72 hours. Wire made for high-tension purposes, that is to stand the electromotive force of 5,000 volts and over, remains in 72 hours, the same as medium tension, this time being found to be sufficient for all purposes of saturation. On special sizes or wires for special work tests are made to meet the requirements.

Before any electrical tests for resistance are made upon any of these wires an alternating current from an adjustable transformer is applied to all the coils to the tension they are

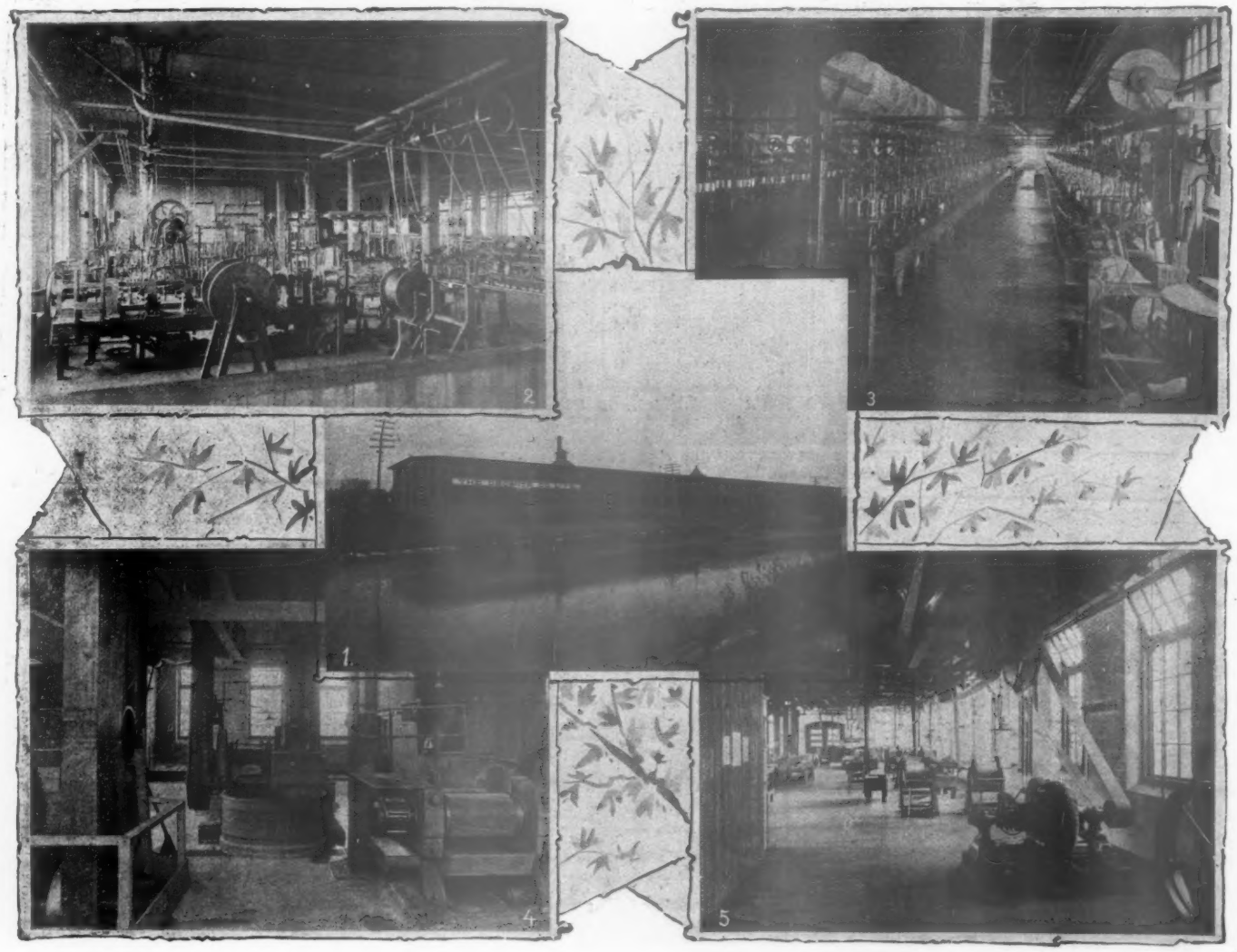

FIG. 3.—VIEWS IN THE PASSAIC, N. J., PLANT OF THE OKONITE COMPANY, LIMITED.—1. FRONT VIEW OF THE OKONITE MILLS FROM THE DUNDEE CANAL. 2. STRANDING DEPARTMENT. 3. BRAIDING DEPARTMENT. 4. WASHING DEPARTMENT. 5. COVERING DEPARTMENT.

made to stand. If the wires are not strong enough to stand this test, the fault immediately shows up by a little flame, where the insulation is punctured in the water. If the coil stands this test, it is then tested by the usual direct-deflection method on the usual instruments for that test. In some cases, where the lengths are short or in case a specially high D. R. is required, Siemens' loss of charge or some similar test is used.

In case a burn-out occurs in the coil, the loop containing the puncture is immediately pulled out of the water and thoroughly dried on either side. The test is then repeated, and, should it stand up O. K., it is then passed on to an expert, who cuts out the puncture. These punctures are naturally more frequent on the low-tension wires than they are on higher tensions, but a coil is never passed until it fully stands all the tests that are put upon it. Very often these coils will stand as many as three or four times what they are expected to, and frequently a coil of low-tension wire will stand as high as 8,000 to 10,000 volts.

The testing apparatus differs little from that generally used in all works for the manufacture of insulated wire. Where so many thousand feet are turned out daily quick methods both of testing and working out results have to be used. The instruments are kept at a coefficient of 100,000 each, so that a reciprocal table will show at a glance the absolute resistance, and another table giving the feet expressed in decimals of a mile is used to find the resistance per mile in megohms. These are further simplified by having logarithms of both tables made out, and then all that is necessary is to take the natural number of the sum of the two logarithms to obtain the megohms per mile. A diary is kept, where a reference can be made at a moment's notice, to find the results of any coil tested at any previous date.

A stranger, upon entering the majority of testing rooms, will always notice how extremely dark everything is kept, so as to be able to see the spot from the galvanometer. Professor Holman, of the Massachusetts Institute of Technology, introduce an idea by which a testing room could be kept as light as possible. The drawing, Fig. 5, on page 16, will show how this idea is carried out at the Okonite factory. The framework holding the scale and lamp is in the form of a triangle and thoroughly enclosed except at the apex, directly opposite the galvanometer, and the base, which holds the scale sliding on a rod for convenience of keeping the zero. An incandescent or oil lamp fitted upon the top of the triangle is shown in the drawing. It will be easily seen that the full light of the beam from the mirror will be received on the ground glass and no outside light can possibly interfere.

In a building where heavy machinery is used there is bound to be a great deal of vibration, which will affect the delicate suspension of the mirror. A method introduced by the electrician of the Okonite Company to prevent this is to add to the usual suspension by a spring a buffer attached to the bottom of the instrument. This buffer rests in a tank of water. The tank could be of any convenient size, and the buffer should be immersed as far as possible, great care being taken that it does not touch the sides of the tank. The addition of a little oil on the top of the water prevents evaporation. The usual suspension by a spring only has the disadvantage of occasionally synchronizing with the steady vibration of the building. This naturally is transformed to the mirror, and the spot, of course, becomes unsteady. The water buffer nearly entirely obviates this. The drawing, Fig. 6, on page 16, will show in detail how the suspension is rigged up.

Where it is possible to get a spot very steady, it is very often useful to have a very long radius for it, and on one of these instruments the radius is 12 feet, making it possible to get a coefficient with 200 volts and half a million megohms. This helps to get a more definite result on short pieces of wire for experimental purposes, etc.

Some college professors are very fond of an electrometer, and no doubt this wonderful instrument is very useful in a laboratory, but for all practical purposes a good condenser and a high coefficient galvanometer will answer.

Special attention and care are also given by this department in testing the core of cables during the different processes of manufacture, so that when a cable is finished, either for aerial, underground or submarine work, it is sure to be O. K. for the work it is expected to do.

In going into the details of the testing, it must not be inferred that this is all. The conductivity of all wires is thoroughly tested, and the Wallace high standard is verified before any conductor is insulated.

FIG. 4.—VIEWS IN THE PASSAIC, N. J., PLANT OF THE OKONITE COMPANY, LIMITED.—1. REAR VIEW OF THE OKONITE MILLS. 2. SHIPPING DEPARTMENT. 3. COILING AND MEASURING DEPARTMENT. 4. SUPPLY DEPARTMENT. 5. CABLING DEPARTMENT.

Bell Telephone Output.

The instrument statement of the American Bell Telephone Company for the month ended December 20, 1895, is as follows:

	1895.	1894.	1893.	1892.
Gross output..	14,429	8,472	4,892	6 270
Returned.....	8,073	6,688	6,126	4,056
Net output...	6,356	1,784	def 1,234	2,714
For fiscal year to Dec. 20:				
Gross output..	176,060	89,498	81,418	93,579
Returned	89,094	72,318	65,438	54,247
Net output...	86,966	17,175	15,980	39,332
Total outs'ding	676,586	582,506	566,491	552,790

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***CHANGES** for advertisements must be in this office by Friday noon for the following week's issue.*

***NEW ADVERTISEMENTS** should be in the office not later than Saturday noon to insure publication the following week.*

NEW YORK, JAN. 8, 1896.

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Ball & Wood Co., engines	iii
Baxter, H. E., & Co., electrical supplies	x
Belden Machine Co., drop forging	xvi
Benjamin, Geo. H., patents	xii
Brill, J. G., Co., railway cars	x
Brixey, W. R., Day's kerite wires and cables	x
Buckeye Electric Co., incandescent lamps	vii
Central Electric Co., interior conduit	iii
Colgate, Geo. L., Co.	xi
Consolidated Telegraph and News Co.	xii
Correspondence School of Technology	xi
De Veau & Co., telephones	xv
Dickinson Electric Supply Co., sign lamps	iii
Dixon, Jos., Crucible Co., belt dressing	iv
Duval, W. S., Jr., patents	28
Dyer & Driscoll, patent solicitors	28
Eddy Electric Mfg. Co., Eddy generators	xiii
Electric Storage Battery Co.	vi
Empire China Works, porcelain specialties	xvi
Eppenger & Russell Co., Valentine subway electrical conduit	xv
Faraday Carbon Co., carbons	xvi
Fleming, W. H., woven wire dynamo brushes	xvi
"For sale"	27
Forest City Electric Works	xvi
Fort Wayne Electric Corporation, "Wood" apparatus	iv, viii
Garvin Machine Co.	iv
Gates Electric Mfg. Co.	vii
General Electric Co., electric light supplies	viii
Globe Electric Light Co., incandescent lamps	v
Gordon-Burnham Battery Co.	ix
Harrisburg Foundry & Machine Co., Harrisburg ideal engines	iii
Helios Electric Co., arc lamps	vi
Homer, F. E., & Co., commutators	xvi
Hooven, Owens & Rentschler Co., electric railway and electric light engines	iii
Huebel & Manger, bells, push buttons, etc.	27
Independent Electric Co., fuse wire	xii
International Correspondence Schools	28
Keystone Telephone Co.	xv
Lane & Bodley, engines	iii
Leffel, Jas., & Co., water wheels	vii
Lehigh Valley Creosoting Co., creosoted lumber	xii
Manhattan Electrical Supply Co., Mesco battery	27
Mansfield, Wallace H., second-hand machinery	xi
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McIntire, C. Co., The, connectors and terminals	xii
Metropolitan Electric Co., supplies	iv
Metropolitan Telephone and Telegraph Co.	xv
Mianus Electric Co., telephones and electric supplies	xv
Moore, Alfred F., insulated electric wire	xiii
Morris, Tasker & Co., tubes, poles, etc.	iv
National Telephone Mfg. Co., telephones	xv
New England Engineering Co.	xiii
New York Belting and Packing Co., rubber belts	iv
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Ostrander, W. R. & Co., supplies	xii
Partrick & Carter Co., electrical supplies for housework	xi
Phillips Insulated Wire Co., wire	27
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Read, Robt. H., patents	28
Replogle Governor Works	iv
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Rodrigues, M. R., premier baby	xvi
Royal Electric Co., alternators	v
Royce & Marean, electrical supplies	xii
Safety Car Heating and Lighting Co.	v
Schoonmaker, A. O., India mica	xi
Scott Electric Lamp Co.	vii
Solar Carbon and Mfg. Co., carbon specialties	xvi
Standard Thermometer Co., arc lamps	vi
Stucky & Heck Electric Manufacturing Co.	xvi
Syracuse Storage Battery Co.	vii
Tice, Josiah, Lockwood telephones	ix
Walker Manufacturing Co.	vii
Warren, A. K., & Co.	iv
Western Electric Co., supplies	xiii
Western Telephone Construction Co., telephones	xvi
Westinghouse Electric & Mfg. Co.	v
Weston Electrical Instrument Co., measuring instruments	x
White-Crosby Co., contracting engineers	xii
Whitney Electrical Instrument Co.	xii
Williams Mfg. Co., tanks	vi
Wyckoff, Seamans & Benedict, "Remington"	xi
World Manufacturing Co.	xi

Our London namesake suggests that the warlike attitude of President Cleveland on the Venezuela question is only a counterblast to the criticism of Prof. George Forbes on the land of the free. Our esteemed contemporary should be careful at whom it aims its persiflage—Forbes is likely to take it seriously.

In his annual message to the New York State Legislature Governor Morton refers as follows to the application of electric motive power to canal boats:

The recent experiments with electric motors for canal-boat propulsion made at the western end of the Erie Canal were so successful in character and results as to lead to the belief that when the system is applied to the entire canal it will increase its traffic capacity by at least 35 per cent. Viewing as a whole the many considerations embraced in this subject, it may safely be suggested that it is one of great importance, and not only merits, but will doubtless receive, your most earnest attention.

The amount of electric railway construction which is reported to be projected for 1896 is larger than ever before. In New York city alone an immense amount of money will be spent in building underground trolley lines, if the present plans of the Metropolitan Traction Company are carried out. In nearly every section of the country improvements of existing overhead trolley systems and the building of extensions and connecting lines are contemplated. There are indications, too, that considerable work may be done in equipping short steam railroads with electric power.

TELEPHONE CONTRACTS.

The question of telephone contracts passed upon by the Circuit Court at Detroit will interest many of our readers. The court takes the broad ground that a telephone company is a public corporation, and can not, therefore, dictate the terms on which it will do business. We doubt the equity of this decision and believe that it will be reversed on appeal. When a telephone company is put to a considerable extra expense to supply an individual with telephone service, including line construction, house wiring and installing the instruments, it certainly should have some assurance of at least a partial return on the added investment. Applying the logic of the decision to a street railway company, also a public corporation, the company should be obliged to extend its tracks and service to accommodate any passenger desiring to ride on its cars, and to do so at his best convenience.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

The year 1895 in the financial and business world was one of substantial recovery from the effects of the 1893 panic. The depression extended well into the year, and it was not until March 1, upon the adjournment of Congress, that the improvement set in. It was due in a measure to a basis afforded business interests on which to conduct operations, after long and disastrous waiting occasioned by tariff agitation. Another factor in restoring confidence was the February bond transaction between the Belmont-Morgan syndicate and the government, whereby the Treasury gold reserve was restored. The first expressions were wild fluctuations in the prices of a few commodities. Petroleum was the leader; next came leather, then iron. At the beginning of the Summer wheat commanded attention and later cotton was marked up. Every commodity showed a sharp improvement, which, generally speaking, did not culminate much before the middle or last of September. A natural reaction then set in that was pronounced in some quarters, leaving havoc in its trail. In other directions it was of just sufficient extent to be healthy. The year closed with business on a firmer and higher basis than in March, with encouraging prospects for 1896.

The cloud over the financial world was our unstable currency system. When the February issue of bonds was floated, and powerful bankers interested used their influence to create a demand for our securities abroad, the world for a time lost sight of the fact that the betterment of the country's finances was only temporary, and were heavy buyers of securities. The industrial improvement was an incentive to this demand. About midsummer, when the bond syndicate created artificial conditions in the exchange market by selling bills against its credit abroad so as to prevent shipments of gold, the instability of our finances was once more brought prominently to the front. Europe became a moderate seller on balance. An excellent demand developed at home for these offerings, based upon the enormous corn crop. It was not until Fall that the American public, after taking back large lines of securities, appeared to have been satiated. Its failure to further respond was in a measure due to knowledge that the large crops would command a very low figure in the markets of the world, as well as the disturbance in financial circles abroad, caused first by the Turkish-Armenian troubles and later by the collapse in Kaffir mining speculation. A factor that complicated the situation about this time was the termination of the bond syndicate's protectorate of the United States Treasury and the heavy efflux of gold.

Upon the convention of the 54th Congress it was generally believed that the country would be afforded legislative relief in currency and revenue matters, and a pronounced

bullish feeling developed in consequence. It was reflected in an enlarging interest in the stock market and more or less of a disposition on the part of business to lay and execute plans for 1896. This new development was just becoming pronounced when the Venezuelan war scare developed, and in three days resulted in a panic. The recovery up to the end of the year in values was partial, and it remains to be seen to what extent it will be sustained. Talk of war is gradually becoming as unpopular as it was popular two weeks ago. However, it had the effect of uncovering weakness where it was pronounced, and this is what the business world will be forced to cope with until adequate legislative remedies have been applied. The first result was a raid upon our gold reserve by Britishers, who not only sold American securities very heavily, but made a peremptory demand for balances accruing in the natural course of business and investments. New York banking interests up to this time had been able to stem the tide. The latest development of the year was the conditional decision of the administration to issue a lot of bonds for gold in order to protect the reserve until such time as Congress can come to the Treasury's relief. The effect of this measure will eventually be to restore confidence. In the meantime there must, of necessity, be a period of uncertainty, which does not argue well for business or security values. The silver element in the Senate has shown its teeth in a way that discourages advocates of speedy sound currency legislation.

Accompanying is printed a table showing the opening, high, low and last prices of the year in representative electrical stocks. Generally speaking, the low prices were established in February, the slump that culminated on December 21 not having extended to this level. There are notable exceptions, however, as will be seen by the table. The most noteworthy feature was the advance from the low early in the year to the high of the midsummer or Fall. It indicates that securities of this kind are quick to respond to any improvement in the general situation.

The table follows. The date of the high and low is given. The opening prices were near the first of the year, and the closing in every case were in the latter part of December.

	Opening.	Highest.	Lowest.	Last.
Gen. Electric ..	33⅛	41, Sept. 9	20, Dec. 21	25⅝
Ed. El. Ill. N. Y.	101	103¾, Jun. 15	94½, Mch. 13	*94½
" " " Bkyn.	110	113¾, Jan. 4	106, Aug. 15	108
Erie Tel. & Tel..	51¾	70, Oct. 16	45⅛, Feb. 13	56⅜
Am. Tel. & Cab..	91	100, Aug. 23	89, Mch. 9	90
Bell Telephone.	190	210, May 20	175¾, Apl. 17	197
Elec. Stor.....	†30	75½, Oct. 19	22, Dec. 21	28
" " Pfd..	†30	76, Oct. 19	23½, Dec. 21	29
Gen. Elec. Pfd..	67	72, July 8	60, Feb. 5	58½
N. E. Telep.....	67	91, July 15	66, Feb. 15	88
West'ghouse...	32½	35, May 13	25, May 13	32
" Pfd.	50	50, May 13	50, May 13	53
Comrcial. Cable.	190	175, Dec. 12	145, May 10	175
Postal Teleg.....	50	82, Nov. 27	60, Apl. 16	78
Western Union.	86⅝	95⅝, Sept. 3	83¼, Dec. 21	85¼

† March 9.

* Declined to 89 on January 2, 1896.

An echo of the panic was a drop of 5 points in Edison Electric Illuminating on Thursday of this week to 89. This is the lowest price at which the stock has sold for over a year. The slump was caused by the closing out of a loan. The officers of the company made reassuring statements, among them one in effect that 1895 business would show 8 per cent earned on the stock against 6 paid.

New York & New Jersey Telephone Company declared the regular quarterly dividend of 1½ per cent and an extra dividend of 1 per cent, payable January 15 to stockholders of record January 4. This is one of the best of the telephone securities. I am told that the stock is very well distributed in investment circles and to a considerable extent in New England.

The electrical security market this week was very tame. General Electric rallied 1 point to 26½. Western Union was under bear pressure that forced the stock down some 2 per cent. The rallies were feeble. On the Boston Exchange, Bell Telephone only feebly reflected litigation developments in the Berliner patent case. The high point was 202 on Monday, the low 197 on Thursday and the last 198. Erie Telephone dropped 1 point to 60½. New England Telephone was unchanged. Westinghouse common was 32 @ 33 and the preferred 53 @ 54. Electric Storage Battery common rallied from 24½ to 28 and the preferred from 27 to 30. Each relapsed 2 points at the close. BAIN.

New York, January 4, 1896.

PERSONAL.

Col. H. M. Watson, the eminent street railway man of Buffalo, enjoyed the dying hours of the old year in New York city.

Mr. W. C. Bryant, of the Bryant Electric Company, of Bridgeport, Conn., will enjoy the New Year in a handsome new residence just completed.

Professor Simon Newcomb, Alexander Agassiz and Henry A. Rowland, of Johns Hopkins University, Baltimore, have been made officers of the Legion by the German Emperor. All are corresponding members of the German Academy of Sciences.

Mr. John A. Brill, of Philadelphia, spent the last day of the old year in New York, with his friend Mr. H. M. Littell, president of the Atlantic Avenue Railway Company, of Brooklyn. Two finer-looking or better-known men are not to be met with in the electric railway business.

"Under-Running Trolley" Case Reopened.

Judge Townsend, of the United States Court at New Haven, Conn., has reopened the case of the Thomson-Houston Electric Company *vs.* Winchester Avenue Railroad Company, which was decided in favor of the Thomson-Houston company two weeks ago. The question is whether the patents owned by the General Electric Company really cover the exclusive use of the "under-running trolley." The Westinghouse Electric and Manufacturing Company defended the case for the street railway company.

Chicago Electrical Association.

The Chicago Electrical Association held its third meeting for this season at 1737 Monadnock Building, January 3. The paper of the evening was by W. Clyde Jones on the "Protection of an Invention," and was a very concise and complete statement on the facts regarding American patent laws and customs, that cannot fail to be of benefit to the numerous inventors in the electrical field. The discussion which followed was taken part in by W. R. Garton, Thos. G. Grier, S. B. Jamieson and others.

Following the paper the election of officers for the ensuing year was held, and resulted in the election of W. Clyde Jones, patent attorney with Barton & Brown, president; S. G. McMeen, assistant engineer Central Union Telephone Company, Chicago, vice-president; J. R. Cravath, electrical editor *Street Railway Review*, secretary; F. S. Hickok, engineering department Western Electric Company, treasurer. There has recently been a great increase in interest and membership of the association, and it promises to take a prominent place among the local societies in the largest cities in the country.

"Western Electrician" Burned Out.

We sincerely regret to learn that the printing office of our esteemed contemporary, the *Western Electrician*, was burned out on Monday of this week. The issue of the paper for the current week may be slightly delayed. The hustling abilities of our Western friends will doubtless be equal to the emergency. With such a valid excuse, even a week's delay in the delivery of the *Western Electrician* would be pardoned by its readers. But the Postal Telegraph Building at 253 Broadway, New York city, still stands—and yet the *Electrical World* for last week has not been issued as we go to press. Has our tea-green contemporary at last taken pity on its few paying subscribers and allowed them a temporary respite?

Death of Prof. James Webb Rogers.

Prof. James Webb Rogers, who some years since became widely known through his connection with the notorious Pan-Electric Telephone Company, died on January 2, at his home in Bladensburg, Md., aged 74 years. He was a Princeton graduate and a lawyer, and had been president of a company controlling some telegraph inventions of his son Harris, who was also interested in the pan-electric business.

The trouble which the International Telegraph and Telephone Company have been experiencing in their line between Gouverneur, N. Y., and Pope's Mills, on account of the cutting of wires, appears to be ended. The publishing of a reward for the apprehension of the operators and the vigilance of the authorities seem to have had the desired effect. The last trouble met with by the company was the felling of a tree across the line.

Three Good Men Wanted.

The ELECTRICAL REVIEW knows of three good positions for three good men, and we can put any of our readers in communication with the proper persons.

First, an electrician of experience in manufacturing, who is capable of designing transformers and taking full charge of a department for their construction.

Second, a dynamo and motor designer of experience, familiar with the latest practice.

Third, a practical man to estimate the cost of materials and construction for wiring installations and capable of superintending electrical work.

Applications for any of these positions may be made to the editor of the ELECTRICAL REVIEW, 13 Park Row, New York.

Good Lead Pencils.

The Joseph Dixon Crucible Company, of Jersey City, N. J., has favored the ELECTRICAL REVIEW with a package of assorted lead pencils as a holiday remembrance. In these stirring times, when patriotism stands forth so prominently, every good American citizen should confine his purchases to American products—even lead pencils. It is well to remember that Dixon's pencils are made of American materials, by American workmen, and, further, that they are the best pencils made anywhere by anybody.

A Decision on Telephone Contracts.

Judge Carpenter, in the Circuit Court at Detroit, on January 3, held in the suit against the local Bell Telephone Company that the company has no right to compel subscribers to sign contracts. The company has appealed.

The broad ground on which the court rendered its decision was that the telephone company is engaged in a public business and can not, as can an individual, determine with whom, how or on what terms it will do its business.

J. Grant High Is Out of It.

Mr. Geo. T. Eyanson has acquired the interest of J. Grant High in the business formerly conducted under the name of J. Grant High & Company, at 123 North Third street, Philadelphia. The business of manufacturing switches, electrical specialties, etc., will hereafter be carried on by Eyanson & Armpriester.

Crocker-Wheeler Electric Company.

January 15, 16 and 17 will be "visitors' days" at the Ampere, N. J., works of the Crocker-Wheeler Electric Company.

The Maracaibo Electric Light Company, of New York city, has increased its capital stock from $100,000 to $336,000.

WHAT NEXT IN ELECTRIC RAILWAY WORK?

READ BEFORE THE CHICAGO ELECTRICAL ASSOCIATION, DECEMBER 20, 1895, BY J. R. CRAVATH.

It is not the purpose of this paper to indulge in extravagant prophecies as to the wonderful things that the electric railway will be accomplishing at a somewhat uncertain future date. Others have very fully occupied that field. My idea is rather to briefly outline some of the new engineering features that will probably enter into electric railway work in the immediate future. Whatever predictions are made here are not considered infallible even by the writer. They are simply the present opinions of one who has been connected with the electric railway industry for some time past (and who has had an opportunity to take a tolerably broad view of the field), as based on observation and on the apparent direction of present activity. Some of them will doubtless need to be modified before many months. This paper will be confined to electrical and mechanical features, and no attempt will be made to treat of the electric railway as a future factor in political economy.

Future changes in the electric railway field will, of course, consist of improvements in existing street railways and the installation of electric traction either to replace steam or to answer some new transportation requirement. While the electric street railway has reached a wonderful degree of perfection in a short time, it would be very discouraging and unwise to consider that there are not to be still further great improvements. From present appearances the improvements will be in details rather than in great changes as far as roads in city streets are concerned.

Much has been said, especially of late, about the assured practicability of the conduit or some form of underground system. There are two things that must be proved about such systems before they can be considered as out of the experimental stage. They must be successful from an engineering standpoint and profitable from a commercial standpoint. Now, either one of these requirements can be met apart from the other, but the sticking point comes when the attempt is made to combine them in one and the same piece of track. For example, by selecting a clean, well-drained residence street, with light traffic, there is now very little doubt but that a conduit system can be made a success electrically, but there is also very little doubt but that on such a street it would not earn enough to pay interest on the cost of its construction. If, on the other hand, a conduit system is laid on a street where there is a heavy enough traffic to warrant the expenditure, it will be found that in very many cases the street is, on account of the very crowded condition which brings to the road the heavy traffic, in a condition fatal to the success of a conduit. It can not be denied that there are a few places where the two requirements are met and a conduit system would be a success, but those places are so few and far between at present that no great development is to be looked for as long as the overhead trolley remains as simple and reliable as it is.

The conduit at Budapest has been pointed to as a shining example to be followed by all American roads. I am informed by good authority that this conduit is on a wide, clean, well-drained street, and that the street traffic is nowhere as congested as in crowded American centers. The same company that owns the conduit is now building an extensive trolley system. This latter fact speaks for itself. Lenox avenue, New York, and Ninth street, Washington, have been equipped with conduit roads the past year, and, although they have not passed through a winter yet, there is good reason to think that they will undergo the ordeal, because Lenox avenue is a broad, clean, excellently drained street, and the clean streets and mild climate of Washington are of national reputation. But what engineer familiar with the conditions would intelligently maintain that such conduits would surely be successful on the downtown streets of Chicago? For the benefit of those who have not observed the condition of our streets at certain times of the year, I will explain how snow, ice, water, heavy traffic and level streets combine to make a state of affairs very uncomfortable for the operators of a conduit system. After heavy snowfalls there is generally a large amount of snow which does not get cleaned away immediately. In a crowded street a great quantity gets packed down hard and ultimately forms ice in such places as to prevent drainage. Then another snowfall followed by a thaw, and perhaps a rain, puts an amount of water in the street that often nearly fills the cable conduit in places. I think it is plain that in view of these facts an open electric conduit road would not be very successful in this city or in many cities where the conditions are similar. The closed conduit with contact pins on the surface, made live as the car passes over, which is being exploited by the Westinghouse company, is apparently a good one from an engineering standpoint, and we will no doubt hear from it in the future. I do not know how it is as to cost compared with the open conduit, but considering the large number of water-tight automatic switch-boxes that must be used in a mile of track, it does not seem to a casual observer that there would be much, if any, gain in first cost over the open conduit. Of course, it has the advantage that it can be used with the common track already laid. It is manifestly not easy to keep the water out of several thousand switch-boxes laid in a sometimes flooded street and with insulated electrical conductors entering each box at several points. However, this is not an impossibility and may not be as difficult as it appears. The boxes and contact pins, as well as the insulated settings of the contact pins in the box, will have to be immensely strong as well as watertight, because the pins have to project above the box and pavement, and the blows they will receive from heavy wagons on crowded streets will not be light. In spite of this, the fact that a concern like the Westinghouse company has taken hold of it is a guarantee that it has been carefully investigated by competent men, and commercial success is in a degree thereby assured.

Returning from these speculations to our street railways as they exist today, and looking for probable improvements, we find that at present great attention is being given to the matter of improved brakes. Here, then, we may look for great advance in the near future. Indeed, a change is going on even at the present time. The brakes now prominently before the street railway trade may be divided into four general classes: 1. Air brakes. 2. Friction brakes, deriving their power from some form of friction clutch operated by the momentum of the car. 3. Electric brakes operated by current from the power house. 4. Electric brakes operated by the motors acting as dynamos. The air brake has the advantage of being easy to apply properly to trailers and easy to regulate to a nicety. The friction brake has been used in various forms on cable trains for years and has but recently been put in forms applicable to electric cars. This type of brake is cheap and simple and does not require skilled labor to repair. The electric brake operated from the trolley is in a bad predicament if the trolley comes off or the circuit is opened, but otherwise has the same advantages as an air brake, with much greater simplicity. These brakes generally consist of some form of solenoid or sucking-in coil which draws up the ordinary brake levers. The current through the solenoid is varied by a brake-controlling rheostat on the platform. Some of this type have arrangements for using the current from the motors acting as dynamos in cases of emergency when the current from the power station is cut off. Before considering the fourth type of brake enumerated it may be well for a moment to discuss the peculiar conditions which a street railway brake must attempt to fulfill. Owing to the variable conditions of the track, braking methods that would be satisfactory on a steam road with a uniformly clean rail are entirely unsuited for street service. On steam roads it is customary to adjust the brake rods and air-brake cylinder pressure so that the maximum pressure the engineer can put on brake shoes in making an emergency stop will not skid the wheels. It is well known that the retarding force falls off two-thirds the instant the wheels begin to skid, and in addition to this objection a skidding wheel almost invariably has a flat spot worn on it, that will necessitate its rejection before it gets much older, unless the rail at the point of skidding is very greasy. Now, some one will ask: Why can not air or electric brakes be put on street cars and adjusted so that even the emergency pressure will not skid the wheels? This is possible, but not practicable. Let us see how it would work in practice. For example, suppose a road which has its cars equipped with air brakes made a careful series of experiments to find out what was the maximum brake-shoe pressure that could be used without skidding wheels on a dry track, and then adjusted brake levers and air pressure so that said brake-shoe pressure could never be exceeded. Apparently now the road is on the high road to a big wheel mileage. Everything goes well until the first muddy day comes, and then trouble begins. The track is effectually greased with mud and the coefficient of friction between wheels and rails has fallen off by a large per cent. A brake-shoe pressure that would fall far short of sliding the wheels on a dry rail does it easily when mud or snow is present. To reduce the maximum available brake-shoe pressure to that which would never skid the wheels on a muddy rail would be to reduce the braking power under control of a motorman to an extent that would invite accidents by greatly reducing the braking power available on a dry track. It is evident that the steam road plan of keeping down the repair-account item of flat wheels will not work on a street railway. Right here I want to put in a plea for the better training of motormen in this respect. Teaching a man to handle the controller is a matter of little difficulty compared to educating him to the skillful use of the brake and sand on a greasy track so that he can make quick stops (both service and emergency) without causing flat wheels. If sand is not used there will not be so many flat wheels as if it is, but the danger of accidents is greatly increased. When sand is used experience has demonstrated that numerous flat wheels will generally be developed by the application of sand at the wrong times, viz., after the wheels are locked and skidding. The street railway manager is thus between the two evils—accidents without sand and flat wheels with sand. Any of the first three enumerated kinds of brakes do much to mitigate these evils because they are quick acting and require little muscular effort. When it is easy for the motorman to quickly release and make another application it is found that he will not be likely to let the wheels continue to skid in making a stop as if he were working a hand brake. But, as said before, the prevention of flat wheels is left to the skill of the motorman in making each and every one of the many hundred stops he makes in a day. One mistake on his part may cause a flat wheel. While the first three types of brakes do much to prevent flat wheels, the electric brakes, in which the braking current is derived from the motors acting as dynamos, go a step further and absolutely prevent them, while at the same time the maximum braking effect consistent with the condition of the rail is assured. The reason of this is self-evident. When the motors revolve they furnish current. The moment the wheels stop the motors stop, and the braking effect is reduced so as to free the wheels. It is truly remarkable to observe the braking effect with this form of apparatus even on a slippery track. This is accounted for, of course, by the fact that the wheels are retarded just to the point of skidding and no further. This form of brake has but recently been out in a thoroughly commercial shape for service with ordinary double-motor equipments. It has probably not by any means reached a final form, but in its special field it certainly has a bright future. It does not insure the absence of flat wheels on trailers, but a half-loaf is better than none, and when quick stops can be made in regular service with an entire absence of flat wheels on motor cars it is a long step in advance, as the flat wheel is one of the most troublesome features in street railway work at present. On elevated and other roads where the number of wheels carrying motors is small in proportion to the number of wheels in train, and the rails are uniformily clean, the advantages of this brake begin to disappear and the air brake at present has a clean sweep. However, it would be by no means surprising if within a few years some kind of electric brake was evolved for this latter service, as some able talent is at work on this problem. Steam roads adopting electricity for branch lines will naturally want to keep their equipment standard and cling to the Westinghouse air brake, so that for some time to come electric brakes for continuous trains will have a limited field and uphill work to secure adoption outside of that field. Nevertheless, it would be unwise to predict against their ultimate success.

(To be concluded.)

D'Arsonval's Treatment for Electric Shock.

Dr. A. D'Arsonval, as president of a committee of electrical experts appointed by the Paris Academy of Medicine to advise means for resuscitating persons affected by an electric shock, has rendered a report, of which an abstract appears below:

"The writer has always maintained that even the victims of very heavy shocks—as long as the tissues are not destroyed—may be resuscitated by means of artificial respiration. I learned this fact by numerous experiments, and the report of a typical accident in which my method was successfully tried confirmed all I ever entertained for it. Addressing, as I do, these suggestions to practical workmen, I think it best to append the minutes of the report itself by way of demonstrating my theories.

"The disaster occurred at St. Denis. There were three wires supported by a small post fixed to a wall about eighteen feet above the ground. A workman, who carried with him a telephone wire which he was about to fix, was struck while sitting astride on the lower connecting bar, holding in one hand one of the conductors and allowing the telephone wire to trail downward. The moment the loose wire—that, by the way, rested with one end on the connecting bar—touched another of the three conductors the current was closed through the man; it entered by one hand and escaped in short circuit by one buttock.

"Mark, this was a very heavy shock. The man underwent directly the whole tension of 4,500 volts. Happily the official superintending, 'the collector,' suspected an accident when the apparatus issued sparks, occasioned by the short circuit. He stopped the machinery. How soon after the actual occurrence of the accident the current was cut off could not be ascertained from any of the parties concerned. It is within reason to assume that the victim underwent the tremendous current for at least several minutes. Perhaps six or seven.

"One of my assistants arrived at St. Denis from Epinay about a quarter of an hour after the current had been cut off. The man was then still astride the connecting bar, and no longer exhibited any signs of life. The first duty was to release the body from the awful position. As may be imagined, it was very difficult to take him down, and the operation took at least half an hour, though some of the workmen were provided with rubber gloves. Thus three-quarters of an hour at least had passed before artificial respiration could be practiced on the body. There was no response for a long while. Then my assistant thought of another method I had advised. He forced open the man's mouth and loosened his tongue. Almost immediately his lungs began to act, and after two hours he was able to speak. Three weeks after the accident I saw the man. His burns on the right hand and on the buttock had nearly healed, and no particular trouble due to the passage of the current through the body had manifested itself.

"A similar case is reported from Rochester, in the United States. There the foreman of the electric company received through his body a 3,000-volt current. To all appearances he was instantly rendered lifeless, but three other workmen, acquainted with the D'Arsonval method of resuscitation, saved their comrade by prompt action.

"My formula for reviving the victims of electric shock is this: A person so disabled should be treated like one drowned. These are the directive rules, which not only workmen in electrical industries, but every citizen and every friend of humanity should know by heart:

"Above all, break the contact with the conductors. If the current can be instantly cut off, so much the better. If not, lose no time by telephoning or sending, but apply yourself directly to the body that must be removed.

"In doing so touch not the victim on face or hands, or any naked part of his body. You may try to lift him up by the coattails, or after throwing a blanket or coat around him. Mind, they must be dry. Also remember that dry wood is a non-conductor. You may use a stick to draw the body over to one side or to hold back a live wire. To lift the victim off a crossbar pass a piece of lumber under his heels and raise him up. The same should be done if the body is in contact with the ground. His feet should be raised from the earth immediately. Any piece of wood or furniture or cloth will do.

"The body should be carried into the open or a room where air has free access. All not directly engaged in the work of rescue should be instantly dismissed from the place. The body must be placed upon the back after the shirt and collar have been loosened. Raise the shoulders and let the head fall back.

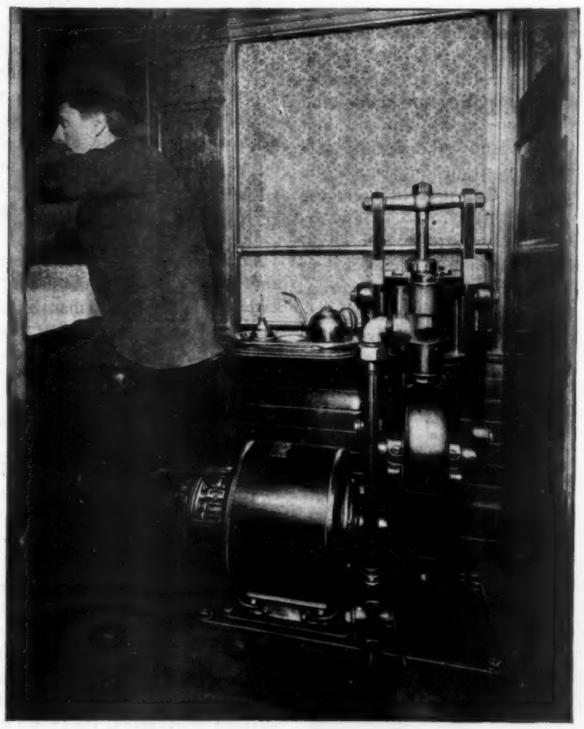
"Then begin the work of restoring respiration; that is, seize both arms and draw them energetically over the head, bringing them nearly together and holding them in that position for a couple of seconds. These movements having expanded the chest and pressed air into the lungs, carry the arms down to the sides and front of the chest, doubling them up at the elbows, in order to expel the air from the lungs. Continue in this for at least an hour, unless respiration sets in before.

"A second samaritan should at the same time seize the tongue of the victim—it is well to protect one's finger with a piece of cloth or a glove for this process—and draw it out while the arms are extended over the head, allowing it to recede when the arms are pressed against the sides of the breast. Both of these manœuvres should be carried on with as little interruption as possible. Twenty times per minute is not too much.

"If the victim shows a tendency to clinch his teeth, keep them apart by placing a piece of wood or anything handy between them.

"It is also advised to rub the body with brushes, brooms and cloth, in order to promote the circulation of the blood.

"Do not administer stimulants unless a medical person pronounces it safe to do so. When possible procure a tank of oxygen gas from the nearest drug store, and after improvising a cone, place the tube over the mouth and nose while the gas is issuing. It is a powerful stimulant to the heart's action under certain conditions, and will aid respiration."



AIR BRAKE USED ON THE METROPOLITAN ELECTRIC ELEVATED ROAD, CHICAGO.

Maguire & Baucus, Limited.

Maguire & Baucus, Limited, have been incorporated in New York State by Wm. H. Paxton, Walter B. Howe, A. E. Miller and others, of New York city, to purchase and sell patents, licenses, contract rights, powers, etc., relating to inventions, machines and processes, electrical or otherwise. Capital stock, $250,000. Mr. Franck Z. Maguire, whose recent success in European countries in the introduction of the phonograph and kinetophone has been noted in these columns, is the head of the firm, whose offices are at 44 Pine street, New York city.

The Harrison company is reported as having recently completed an addition to its toll lines connecting Goodland, Kentland, Fowler, Brook, Forseman, Lochiel, Percy, Lafayette, Crawfordsville, Rensselaer and other intermediate towns in Indiana.

Air Brakes on an Electric Elevated Road.

Without doubt one of the finest equipments of its kind that can be found is that of the Metropolitan West Side Elevated Railroad, of Chicago, Ill. Elevated railroads in many respects far exceed all other means of transportation within city limits, yet when operated by steam there are numerous features about them that are objectionable; thus the public are quick to appreciate a road which is operated by electricity, where there are no flying cinders, no objectionable, puffing locomotives and no jerky, jumping motion, sometimes felt the whole length of the train at every stroke of the piston on the engine; where the trains almost seem to glide in and out of the stations; where the road is built between the blocks, so the main streets are not disfigured and rendered dark, gloomy and disagreeable.

A very important feature in the smooth operation of a road lies in the system of braking. In this respect, as in several others, the equipment on the above system is second to none, and this one feature presents several points of interest. The air compressors, which were furnished by the New York Air Brake Company, are placed in the cab set apart for the use of the motorman. These compressors are operated by motors directly connected, and, as will be seen by the accompanying illustration, the equipment is very compact. The motors are completely enclosed, dust and moisture proof, and were furnished by the Storey Motor and Tool Company, of Philadelphia, who also supply equipments of a similar kind for lighter work and for use on ordinary trolley cars, as well as motors for all kinds of pneumatic equipments.

These machines run at a speed of 650 revolutions at 450 volts and develop three and one-half horsepower. They are constructed to stand an increase of voltage to 700, and occupy a space over all of 15⅛ by 30½ inches. They weigh 400 pounds and there are at present 61 of them in operation.

It would be an agreeable surprise for some of our New York friends if they could take a ride on this road; they would surely be astonished to see the difference between an elevated road operated by electricity and one where steam is the motive power.

Electric Construction and Supply Company.

The following advertisement appeared last week in the New York daily papers:

The first annual meeting of the stockholders of the Electric Construction and Supply Company, organized under the laws of the State of New York, in March, 1895, for the election of five directors, to serve for the ensuing year, will be held at the office of the company, 110 Liberty street, on Thursday, January 9, 1896, at 1 o'clock P. M.

CHARLES E. ROCAP,
Secretary.

Improvements in Electricity.

The New York *Herald*, with its usual commendable enterprise, published on January 1 a number of telegrams from people prominent in all walks of life and industry responding to its question as to what inventions or improvements would, in their opinions, do most to better the conditions of life. Several of these answers are published below:

ELECTRICITY FROM COAL.

To the Editor of the Herald:

In reply to your wire as to what discovery or invention would do most to better the conditions of life, I would say the production of electricity direct from coal. EDISON.

Orange, N. J., December 31, 1895.

ELECTRICITY FOR STREET CAR LINES.

To the Editor of the Herald:

Replying to your message as to what would do most to better existing conditions, I would say the immediate and complete reconstruction of the existing horse-car lines in New York city into lines operated by an underground current of electricity and an enactment of a law prohibiting the use of street railway tracks by other vehicles, except in case of necessity, would, in my opinion, give the best system of transportation that the configuration and construction of the city would permit.

H. H. VREELAND,
President of the Metropolitan Street Railway Company.
New York, December 31, 1895.

POSSIBILITIES IN ELECTRICITY.

To the Editor of the Herald:

In reply to your telegram asking what is the most needed improvement in telegraphic service, I think placing underground cables along the railroad tracks between important business centers would tend to make the service most reliable; and the perfection of a rapid page printing telegraphic machine, with keyboard adapted to the use of any one who can use a typewriter, would tend to make a service that could be used by the layman in small towns without going to the expense of maintaining a regular operator. These points are now being considered, and their perfection is only a matter of time.

CHARLES CUTTRISS,
Electrician Commercial Cable Co.
New York, December 31, 1895.

ELECTRICITY WITHOUT WIRES.

To the Editor of the Herald:

In reply to your question as to what discovery would do most to better our condition, in my opinion the demonstration that the earth's electrical charge can be distributed, and thereby electrical waves efficiently transmitted to any distance without the use of cables or wires, would be the most beneficial.

The conveying of motive power from sources such as Niagara in this manner to any place, however remote, would increase many times the productive capacity of mankind. It would bring millions of miserable creatures from the darkness of the coal pits to the light of day. It would cause a kinder feeling to spring up between the weak and the strong, which would lead to a general adjustment of the evermore difficult questions of labor and capital.

Even if power could not be distributed, the mere transmission of intelligible signals would be of incalculable benefit. Such a realization would do away with the instability of the financial markets, which is the cause of much suffering and misery. It would greatly facilitate the evolution of novel ideas as well as the prevention of evils. It would increase the safety of travel and give a new impetus to the press and spread of knowledge. The first message transmitted would be the signal to general disarmament and a closer union of nations, and the words of the great German poet, "Seid umschlungen Millionen, diesen Kuss der ganzen Welt," would be deeply felt everywhere.

Our present knowledge is sufficient to fill us with the conviction that the solution of these important problems is not far off. May the new year witness these triumphs.

NIKOLA TESLA.
New York, December 31, 1895.

Breastplate Telephone Transmitter.

This apparatus is designed to replace the stationary telephone and receiver, or the combined hand telephone transmitter and receiver, so frequently used in telephone stations, says London *Lightning*. The special advantage gained is that the operator has both hands free for connecting subscribers on the switchboard, and that the transmitter is always in a convenient position for use. The key placed below it is to insert the microphone battery, and it is so arranged that the battery can either be kept continuously in circuit or can be momentarily put in by pressing a button, the purpose being to spare the battery when conversation

BREASTPLATE TELEPHONE TRANSMITTER.

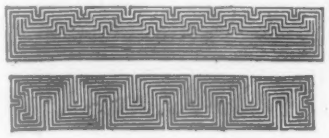
is intermittent. The breastplate and stand for the transmitter are made of aluminum, which is also used for the receiver, so that the whole apparatus is very light. The transmitter is adjustable, to permit of the operator placing it at the most convenient speaking distance, and the mouthpiece is readily removed, so that each operator may use his, or her, own. The apparatus is manufactured by Messrs. L. M. Ericsson & Company, of Stockholm, and can be obtained from their agents, the Ericsson-Bell Telephone Company, of 29 Waterloo street, Glasgow, Scotland.

The Sauquoit and Paris telephone line may soon be extended to Clayville, N. Y., and later to Norwich Corners.

The "Dovetail" Dynamo and Motor Brush.

The "Dovetail" copper gauze brush, manufactured by F. W. Potter & Company, is illustrated and described in a recent number of the London *Electrician*.

These brushes, which are made under Soar's patent, are not stitched, do not wear oval at the commutator, do not turn up at the points, and require a minimum of attention. The "Dovetail" brush is so folded that the part intended to face the commutator consists of plain layers of



FIGS. 1 AND 2.—"DOVETAIL" DYNAMO AND MOTOR BRUSH.

gauze to the extent of about one-half of the thickness of the brush, backed by about an equal quantity of gauze folded or corrugated at or nearly at right angles to the plain layers, as shown in Fig. 1, or without the plain layers, as in Fig. 2, and the degree of stiffness given to the brush can be varied to almost the rigidity of metal.

Electricity and the Processes of Life.

The relation between electricity and those hidden processes of cell activity whose outward manifestations we recognize as the signs of life has always been a matter of the greatest interest, says the London *Hospital*. Unfortunately, its investigation has also been a matter of the greatest difficulty. Experiments which have been made, however, upon freely floating organisms are very suggestive. According to Dr. Augustus Waller,* if a galvanic current be passed through a bath containing parmecia in sufficient abundance, a curious sight is observed. When contact is made the whole crowd of parmecia fall into order with their noses toward the cathode, and begin to swim toward it in converging curves, while if the current be reversed, the crowd breaks up, all its units turn round and begin to swim away, as if of one mind, from the new anode to the new cathode; clearly these creatures are more "comfortable," if one may use the term, when swimming with the electric current than the reverse way. This, however, is not a general law for all micro-organisms, for some tend to swim against the current, and others again to place themselves at right angles to it. In a galvanic bath containing a mixture of ciliated and flagellated protozoa, while no current is passing these creatures swim about in all directions in a perfectly indifferent manner, but directly contact is made they divide themselves into two distinct armies, so to speak, which assemble on the two banks; "ciliata to the cathode, flagellata to the anode, seems to have been their *mot d'ordre*," and on reversing the current they immediately change places.

* *Science Progress*, October, 1895.

In regard to more complex free-floating organisms the same is found to be true. Much as cats are more comfortable when stroked the right way than the wrong, and, in fact, will often get up and move away when stroked from tail to head, so it would seem that tadpoles dislike being "stroked" the wrong way by electricity. An experiment is described by Dr. Waller. In a lantern bath were a number of fresh tadpoles, moving more or less leisurely and jostling each other in all directions. On sending through it a current of electricity, he says, "the commotion is amazing, the tadpole community seems to have gone mad, a writhing mass is all that can be distinguished; but the disturbance does not take long to subside, and now all the tadpoles are fixed as if at attention, heads to anode, viz., traversed by a current from head to tail, stroked down the right way."

It can also be shown that if the current is turned on very cautiously to a degree short of making the tadpoles face about, those which happen to be lying in such a direction that it passes through them from head to tail lie perfectly still, while those which lie the other way wag their tails; clearly the whole organism reacts differently according as the current goes in one direction or the other. If two tadpoles happen to be lying in the bath in opposite directions, by cautiously reversing the current the tadpoles may be made alternately one or the other to wag their tails. Of course, in such complex creatures as tadpoles this reaction is not due to the effect of electricity upon individual cells, but depends on the presence of the spinal cord, as may be shown by experiment, for a piece of a tail long enough to contain a bit of spinal cord will tremble when the current is turned on, while a shorter piece is not affected.

These experiments are then sufficient to suggest that to be bathed in a galvanic current may be by no means so immaterial to the proper functionization of the body as some people have imagined. If freely moving organisms are so affected as to swing round in response to the current, it is hard to believe that those embedded cells which can not swing are any the less affected, and it is open to us to believe that they will perform their functions all the less perfectly from their inability to conform to their new surroundings. In relation to this, it is not without interest to bear in mind the assertions continually made by many people as to the distressing effect upon them of what is termed thundery weather, when the relation between the atmospheric and the earth potential is reversed, and when, therefore, the direction of the current discharging through our bodies is abnormal.

The Citizens' Mutual Telephone Company is said to be ready to establish a system in Buffalo, N. Y., as soon as complete arrangements can be made.

EXPERIMENTAL METHOD OF DETERMINING THE EFFECTIVE CENTER OF LIGHT EMITTED FROM A STANDARD PHOTOMETRIC BURNER.

READ BEFORE THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS, NEW YORK, DECEMBER, 1895, BY D. S. JACOBUS.

As many engineers have to supervise photometric measurements, and the burner described herein is of the form often used for such work, the following method of determining the effective center of such burner is considered of sufficient interest to many members of the society to warrant presentation:

In tests of car lamps made by the Department of Tests of the Stevens Institute during the past Spring and Summer it was necessary to employ a burner of about six candle-power as a standard of light. The burner selected was a Sugg Argand gas burner, size D, fitted with an opaque screen of the Edgerton pattern, which passed over a glass chimney. The opening for the emission of light was arranged so that the top and the lower part of the flame were obscured from view, as shown in Fig. 1; whereas the horizontal width of the slot was made greater than the diameter of the flame. The horizontal width AB of the slot was one and one-half inch, and its height C D was thirteen-thirty-seconds of an inch. The diameter of the opaque screen was one and seven-eighths inch. The back of the screen opposite the slot was cut away so as to prevent reflected light from being thrown back and through the slot.

In this class of a screen and burner the distances employed in calculating candle-power measurements are often measured to the geometrical center of the flame. Any error so involved will be a small one, if the illuminated disk of the photometer is used at a considerable distance from the burner, and in about the same position which it occupied when the burner was calibrated by means of candles. In the tests, however, the burner had to be used in positions near to, as well as far away from, the disk, so that it was necessary to determine the effective center of the light which it emitted.

The method of determining the effective center was as follows: The photometer disk was set at A_2 in Fig. 2, at a distance c_1 from the candles C and the standard burner was brought to a position B_1 at which there was an equal illumination on the two sides of the photometer disk at A_1. The distance b_1 from the disk to the geometrical center of the burner was then recorded. The disk was then moved to another position A_2, at the distance c_2 from the candles, and the corresponding distance b_2 from the disk to the burner was recorded. The disk was then set back to its first position at A_1 and a second reading of b_1 obtained. It was then moved to A_2, and then back to A_1, and so on until a number of readings of b_1 and b_2 were obtained. After a sufficient number of readings was taken to eliminate any irregularity due to variations of light emitted from the candles, the results were averaged and the distance, x, of the effective light center from the geometrical center of the flame was found by means of the formula:

$$x = b_1 - \frac{b_2 - b_1}{\frac{c_2}{c_1} - 1}$$

The results of the experiments are given in Table I, and show that the effective light center of the burner was about nine-tenths of an inch

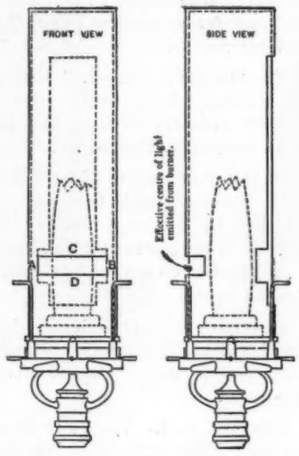


FIG. 1.—EXPERIMENTAL METHOD OF DETERMINING CENTER OF LIGHT—STANDARD LAMP USED IN TESTS OF CAR LAMPS.

from the geometrical center of the flame and entirely outside the flame, as indicated in Fig. 1.

The candles do not have to be corrected for variations in the rate at which the paraffine is burned. All that is necessary to insure accuracy is to make a number of observations, changing the distance of the photometer disk from the candles each time a reading is taken, as has already been explained, and employing the average figures in the formula. When this is done any variation of the light which is emitted by the candles during the test will affect the average values of b_1 and b_2 in such a way as not to alter the value of x.

The error involved, if all measurements were made from the axis of the burner instead of the effective center, both in calibrating and in using the standard burner, would have been as a maximum about 10 per cent in the lamp tests which we made. In these the effective center of the burner was placed at a distance of 60 inches from two standard candles in calibrating the burner, and the minimum distance at which the burner, when used as a standard, was placed from the photometer disk was about 12 inches.

An ordinary way of using the burner is to place it 60 inches from two standard candles to calibrate it, and then set it 60 inches from the flame of which the candle-power is to be determined, all distances being measured by the axis of the burner. If calibrated and used in this way, there is an error of about three and three-quarters per cent for a flame of 20 candle-power, and about six per cent for a flame of 40 candle-power.

Another way in which the burner is calibrated is to measure the candle-power of a uniform gas flame, first with candles and then with the burner, and repeat the two operations until an average figure is obtained. When this is done there is but a small error involved in measuring from the axis of the burner, provided the gas flame which is measured is of about the same candle-power as the flame which was employed for calibrating the burner, so that the distance from the standard burner to the photometer disk is about the same in both cases. If the burner is calibrated at 60 inches from a gas flame of 24 candles, and is used at the same distance to measure the intensity of a flame of 16 candle-power, there will be an error of about one per cent.

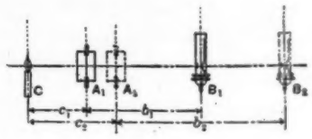


FIG. 2.—DIAGRAM SHOWING METHOD OF DETERMINING EFFECTIVE CENTER OF LIGHT.

TABLE I.—RESULTS OF TESTS TO DETERMINE THE DISTANCE FROM THE GEOMETRICAL CENTER OF A STANDARD PHOTOMETRIC BURNER TO THE EFFECTIVE CENTER OF THE LIGHT WHICH IT EMITS.

No. of Test.	Date, 1895.	Number of Sets of Readings Averaged.	Distances from Candles to Photometer Disk, in, Inches.		Average Distances from Photometer Disk to Burner, in Inches.		Distance from Geometrical Center of Flame to Effective Light Center of Burner $= x$
			c_1.	c_2.	b_1.	b_2.	
1	May 11	21	10	15	19.44	28.70	0.92
2	" 24	15	10	15	18.77	27.71	0.89
3	" 24	9	7	14	12.95	25.00	0.90
4	" 24	9	9	13.5	16.76	24.70	0.88
5	" 28	30	10	15	18.44	27.82	0.88
					Average..... =		0.89

The Business Situation.

[*From the Boston News Bureau.*]

The new year opens more favorably than one would believe possible were he influenced in his judgment solely by the action of legislators or by sentiment at the speculative centers. We have been blessed by bountiful crops; labor is well employed at increased wages and the comparative smallness of mercantile failures shows that general trade has been fairly profitable.

The weakest feature in the situation is our lack of ability to finance the Treasury Department. It is quite improbable, however, that 70,000,000 of English-speaking people in this country will permit a suspension of gold payments under normal conditions. Ways will continue to be found to avoid all such embarrassments until such a time as a satisfactory solution of the financial problem can be agreed upon.

The railroad outlook is certainly brighter. Earnings are not only increasing satisfactorily, but Western sentiment is becoming less antagonistic, and there is greater unanimity as to the maintenance of rates on the part of railroad officials.

The immediate situation is awaiting definite announcement of the new bond issue. The details of the loan are known to only the largest financial interests, and their opinion regarding it is best reflected by the strength in security prices. Values are low, speculative accounts are small and all that is needed to cause enlarged commitments is absolute knowledge as to our national financial strength.

New York exchange is making again in Boston by reason of January disbursements, the American Sugar Refining Company's dividends playing an important part in this respect.

ELECTRIC RAILWAY NOTES.

The petition for a belt electric railway at Woburn, Mass., has been referred to the next city government.

The verbatim report of the fourteenth annual meeting of the American Street Railway Association, held at Montreal, October 15 to 18, 1895, has been issued.

The Akron & Cuyahoga Falls, Ohio, Rapid Transit Electric Company has issued six per cent 20-year gold bonds, secured by a $600,000 mortgage to the West End Trust and Safe Deposit Company, of Philadelphia.

The Electric Storage Battery Company, of Philadelphia, will install a chloride accumulator street railway system at Brookline, Mass. Current for charging the batteries will be purchased from the Newton, Mass., Street Railway Company.

The Portland, Ore., Consolidated Street Railway Company was sold by auction on January 1 and will be operated under the name of the Portland Railway Company. During the past year the road has been put in fine physical condition and is reported at the present time to be paying its running expenses and interest on $750,000 new five per cent bonds.

The Sheriff of New York on January 2 received an attachment against the Bridgeport Traction Company, of Bridgeport, Conn., for $26,000, in favor of Charles E. W. Smith, who lives at the Plaza Hotel, on a claim for commissions. He alleged that he was engaged as broker to sell $1,300,000 mortgage bonds of the company at two per cent commission; that he found a purchaser in March, 1894, to whom the bonds have since been sold by the company. He began suit on February 16, 1895, but the case has not yet come to trial. The Sheriff served the attachment on Redmond, Kerr & Company, of No. 41 Wall street, to attach money there to pay the company's interest coupons due January 2.

ADVANCE INFORMATION

Valuable News and Tips for Manufacturers and Dealers.

We publish below information relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW.

New Electric Railways.

BUFFALO, N. Y.—The Buffalo Traction Company has bought the Buffalo, Kenmore & Tonawanda Electric Railroad. The officers of the company are: President, D. F. Callahan; vice-president, Norman E. Mack; secretary and treasurer, J. L. Donovan.

BATH, N. Y.—The Bath & Lake Keuka Railway has been incorporated to operate a street surface electric road 10 miles long, from the Soldiers' Home to the village of Hammondsport. The capital is $100,000 and the directors are Israel A. Kelsey, of West Haven, Conn.; John T. Prince, of Boston; John T. Prince, Jr., C. L. B. Tyler, F. H. Vielo, George E. Tyler, Charles M. Hyde, E. J. Carpenter and John L. Miller, of Corning.

PORT JERVIS, N. Y.—The Port Jervis Electric Railway Company has been incorporated, with a capital of $70,000, to operate a road seven miles in length.

SPRINGFIELD, MASS.—The directors of the Springfield Street Railway have voted to authorize the increase in the power-house plant.

CLEVELAND, OHIO.—Cleveland & Chagrin Falls Electric Railroad Company has been incorporated. Capital stock, $100,000.

NORTH WOBURN, MASS.—It is reported that the Shaw syndicate has secured a controlling interest in the North Woburn Street Railway and will make it a portion of the Wakefield & Stoneham street railway system.

COLUMBIA, S. C.—The Columbia Electric Railway will probably be extended to Granby, on the Congaree River.

LOS ANGELES, CAL.—C. A. Luckenbach, city clerk, can give information concerning the sale of franchise for the construction and operation of an electric street railway along certain streets in the city of Los Angeles. Bids will be received until January 15.

ST. LOUIS, MO.—The Central Railway Company will erect an electric power plant.

BALTIMORE, MD. — The Rapid Transit Construction Company has been incorporated by Wm. F. Rogers, Chas. H. Hopkins, Wm. O. Nelson, Harry C. Primrose and George N. Holloway for the purpose of manufacturing, etc., in which electricity will be used. Capital stock, $25,000.

CHARLESTON, W. VA. — The Charleston Street Railway will erect an electric power plant.

CHICAGO, ILL.—The Englewood & Chicago Electric Street Railway Company has been granted permission to construct an electric railway. E. F. Cragin is president of the company. The capital stock has been increased from $1,500,000 to $2,000,000.

OAKLAND, CAL.—An electric railway is proposed between Oakland and Livermore and Corral Hollow. E. P. Vandercook is interested.

NEW YORK, N. Y.—The Metropolitan Electric Surface Railway Company has been incorporated by Wm. Lawrence, J. O. Fowler, Jr., W. H. Merrit, W. Cooper and H. S. Starke, all of New York, to acquire patents, rights and inventions relating to " construction and operation by electric power street and other railroads, to generate and acquire electricity, etc. Capital stock, $5,000,000.

WATERLOO, IOWA.—The Waterloo & Cedar Falls Rapid Transit Company has been incorporated by C. J. Fasselman, J. H. Bowman, L. S. Cass and J. H. Rafferty, to construct a street railway between Cedar Falls and Waterloo. Capital stock, $600,000.

NEW YORK CITY.—The Empire City Traction Company has been incorporated to construct a street surface railroad in New York city three and one-quarter miles in length, with the following termini: Hudson River and West 145th street, Harlem River and East 145th street, Hudson River and West Ninety-sixth street, and East River and East Ninety-ninth street. The capital is $100,000, and the directors are Henry L. Scheurman, Frank P. Knight, Edgar M. Johnson, Franklin Defreece, Francis W. Eider, Mark J. Katze, Henry W. Marr, of New York city; Homer R. Scoville, of Brooklyn, and Samuel S. Slatter, of Arlington, N. J.

HARRISBURG, PA.—A charter has been granted to the Latrobe & Ligonier Electric Street Railway Company, of Westmoreland county; length, 12 miles; capital stock, $72,000. Edward E. Robbins, president.

Electric Light and Power.

SHEFFIELD, ALA.—The Consolidated Water and Electric Light Power Company has been organized by E. F. Enslen, C. B. Ashe, L. A. May, F. V. Evans and W. R. Brown; E. F. Enslen, of Birmingham, president, and C. B. Ashe, Sheffield, secretary and treasurer. Capital stock, $250,000.

UNION, S. C.—The Mayor can give information concerning the issuance of $40,000 worth of bonds to be used in erection of electric light plant.

WASHINGTON, D. C.—Representative Livingston, of Georgia, has introduced a bill to incorporate the National Gas Light, Heat and Power Company, of which C. B. Hauk, F. P. B. Sands, Park Agnew, Anthony Pollock, Rensselaer Stone, C. C. Bryan and J. L. Hastings, are the incorporators. The company is authorized by the bill to produce 22 candle-power gas free from impurities and to sell it for private use, at the rate of 75 cents per thousand feet, and 60 cents per thousand feet for city street illumination, and for use in the Departments. Capital stock, $2,000,000.

DUBLIN, GA. — The Mayor will give information concerning election to be held January 11, to consider the question of issuing $25,000 worth of bonds for an electric light plant and waterworks.

KANSAS, CITY, MO.—J. C. Rogers, of Wamego, Kans., will erect a $60,000 five-story building and put in an electric light plant, etc.

GREENVILLE, N. C.—The Greenville Electric Light Company, of which S. C. Hamilton, Jr., is manager, is in the market for an electric light plant of 35 arc and 400 incandescent lights.

CLEVELAND, OHIO.—Metropolitan Gas Light and Heating Company has been incorporated. Capital stock, $300,000.

JAMAICA, L. I.—The Town Board at their meeting renewed the contract with the New York & New Jersey Globe Gas Light Company for lighting the streets of Brooklyn Hills for the year.

BALTIMORE, MD.—The Maryland Electric Company, of Baltimore, and the International Telegraph District Construction Company have consolidated under the name of the Edison Illuminating Company.

NASHVILLE, MICH.—The question of an electric lighting plant is agitating the village. The firm of John Bell & Sons are to furnish the power necessary. Nearly all the business men have consented to having them put in their stores and a great many of our citizens to having them put in their houses.

YOUNGSTOWN, N. Y.—Residents of this place having agreed to pay $1,800 a year for 300 incandescent lights, work on an electric plant will be begun soon.

PORTLAND, ME.—La Capital Company has been incorporated by Theo. N. Vail, Lyndon, Vt.; Francis A. Houston, treasurer, Boston, Mass.; to carry on the business of electric lighting and heating. Capital stock, $1,500,000.

LEXINGTON, KY.—The Mayor can give information concerning the erection of an electric light plant.

CHARLESTON, W. VA.—Charleston Traction, Light and Power Company has been incorporated by W. A. McCorkle, Malcolm Jackson, M. M. Williams, A. W. Watrous, Charleston. Capital stock, $500,000.

CASEVILLE, MICH.—The Caseville Electric Lighting Company has been organized and will erect an electric light plant.

ALEXANDRIA, LA.—The electric light plant is to be enlarged and new machinery added.

SMITHVILLE, TEX.—M. Burleson, secretary, can give information concerning establishment of an electric light plant, for which bids are being asked.

NORFOLK, VA.—Norfolk Electric Light and Power Company has been incorporated by Paul K. Boyd, B. N. Sparry, Geo. Russell. Capital stock, $15,000.

New Manufacturing Companies.

LUDINGTON, MICH.—R. Hansen and Emil Krogh are fitting up a building with new machinery for manufacturing a new electric fire-alarm apparatus. They expect to commence operation in January.

WASHINGTON, D.C.—The Wheeless Electric Lamp Company has made application for charter to manufacture and deal in a new patented lamp. Capital stock, $500,000.

JERSEY CITY, N. J.—The Consolidated Sterling Incandescent Gas Lamp Company has been incorporated by Alfred Luttman and George W. Mark, New York city, and Herbert F. Hatch, East Orange, N. J., to manufacture gas lamps, etc., and manufacture and supply heat, light and power of all kinds. Capital stock, $2,000,000, with $4,000 paid in.

CLEVELAND, OHIO.—The Walker Company has been incorporated by John Ludwig, Brooklyn, N. Y.; Chas. M. King and Martin W. Dixon, Jersey City, N. J.; to manufacture electrical machinery. Capital stock, $2,000,000.

SACO, ME.—The Electric Railway Switch and Supply Company has been incorporated for the purpose of manufacturing and dealing in electric railway motor and station switches and railway supplies, with $100,000 capital stock. President and treasurer, Leonard L. Davis, Springfield, Mass.

Increase of Capital Stock.

NEW HANOVER, MASS. — Stockholders of the New Hanover Electric Railroad in Massachusetts have applied to the State Commissioners for permission to increase the capital stock of the company from $20,000 to $50,000.

New Telephone and Telegraph Companies.

FORT VALLEY, GA.—The Fort Valley Telephone Company has been incorporated by W. H. Harris, B. S. Harris and W. P. Harwell to construct telephone system. Capital stock, $5,000.

Business Troubles.

BROOKLYN, N. Y.—J. D. Bennett has been appointed receiver of the Rockaway Electric Light Company.

ELGIN, ILL.—The Elgin Illuminating Company has assigned.

Medical Batteries.

Stanley & Patterson, 32 Frankfort street, New York city, have recently placed upon the market a line of medical batteries, three forms of which are illustrated herewith. The "Standard" double-deck medical battery is shown in Fig. 1. The battery used is of the best dry form, and the strength of the various currents from it is so mild as to be scarcely perceptible, to the most powerful that can be endured by a strong man. The cell is inclosed in a polished-nickel tube and furnishes three currents—primary, secondary and primary and secondary combined—any one of which may be varied at will by the movement of the small inner tube.

FIG. 1.—"STANDARD" DOUBLE-DECK MEDICAL BATTERY.

FIG. 2.—"STANDARD" SINGLE-DECK MEDICAL BATTERY.

This apparatus is compact and portable, and this feature makes the battery one of great convenience for physicians to carry about. The cabinet is furnished either in mahogany or antique oak, finished in the best manner.

Fig. 2 shows the "Standard" single-deck medical battery, which is of the same general design and appearance as the double-deck machine just described, with the exception that no separate compartment is provided for the electrodes which go with the instrument.

FIG. 3.—"DIAMOND" MEDICAL BATTERY.

The "Diamond" medical battery, shown in Fig. 3, has all the advantages of the "Standard" double-deck instrument in the way of portability and freedom from acids and liquids of every description, and, while smaller than the "Standard," it is capable of giving an equally powerful current. The battery cell is located directly under the coil and can be readily removed when exhausted. An automatic device is provided, which promptly shuts off the current when the case is closed, thus saving the battery should the operator neglect to turn the switch. The cabinet is of highly polished mahogany, with locked corners, and all trimmings are of nickel.

The Storage Battery.

Of the vast amount of energy expended during the past year in developing fields for the applications of electrical appliances, perhaps no one line of effort shows more rapid progress, or more prominent or promising results, than that which has had for its object the elevating of the storage battery to its proper position in the list of electrical apparatus.

The results accomplished have been attained only by burying many corpses and by convincing the men who for years have been hanging crape in commemoration of the failures of storage batteries that their services were no longer required.

A year ago, when the subject of storage batteries was mentioned, there was always some one present anxious to hang the crape—some one who knew of a storage battery plant that had proven a failure, or who, if he did not know, of his personal knowledge, of such a plant, had been told of one. Then some one else lent a willing hand to assist in firmly securing the crape to its place by giving a minute description of how Mr. So and So had installed a battery in his residence, and how the battery, after having given a desultory service for three months (three months was generally the limit), had completely collapsed and been discarded as worthless. The details were elaborated with great gusto, and the narrative was generally considered as highly amusing, Mr. So and So being regarded somewhat in the light of an easy mark. The accounts were generally of breakdowns which had occurred from five to ten years ago.

In Germany, where the use of the storage battery in connection with electric lighting and power plants is almost universal, these funny stories are unknown; in this country they have been heard very infrequently during the latter part of the year 1895. They have lost their piquancy since the advent of the man who tells of battery plants, properly installed, of sufficient capacity to economically perform the work, and many of them, when handled with a reasonable amount of care, have been in entirely satisfactory operation for two or three years.

The corpses of the storage batteries, that died years ago, are rapidly being buried, and before the close of 1896 will probably have been forgotten.

C. P. J.

New York, December 16, 1895.

LITERARY.

The two hundred and eighth volume of *Littell's Living Age* opens with the issue of the week ending January 4. The beginning of a new volume is an excellent time for the beginning of a new subscription, especially when, as in this instance, it includes a new—a lower—price. For 1896 the subscription price will be $6. The reduction in price means no reduction in size or falling off in value, or any lowering of the high standard which it has always maintained. Foreign periodical literature continues to grow not only in bulk, but also in the variety, interest and importance of the topics treated; and it absorbs to a greater extent every year the works of the most prominent authors of the day. For the amount and quality of reading furnished the price ($6 a year) is very low; to those desiring the cream of both home and foreign literature the publishers make a still cheaper offer, viz., to send *The Living Age* and either one of the American $4 monthlies, or weeklies, a year for $9, or any $3 monthly for $8. With *The Living Age* and one or other of our leading American monthlies, a subscriber will, at remarkably small cost, be in possession of the best which the current literature of the world affords. Littell & Company, Boston, are the publishers.

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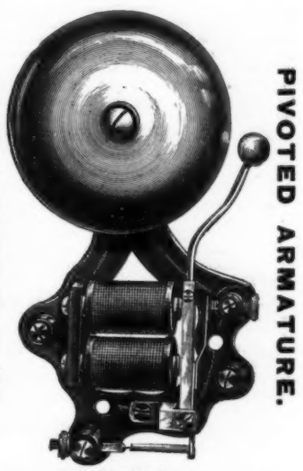

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ELECTRICAL PATENTS

ISSUED DECEMBER 31, 1895.

552,094 Automatic electric switch; H. H. Blades, Detroit, Mich.

552,103 Multipolar electro-magnet; W. P. Daniels, Cologne, Germany.—Consists of an electro-magnet, a plurality of pole pieces therefor, and a yielding adjustable end piece or extension for each of said pole pieces adapted to engage the object to be lifted, whereby the pole pieces of the lifting magnet may adjust themselves to variously shaped objects to be lifted.

552,105 Apparatus for maintaining current upon moving vehicles; H. E. Dey, Brooklyn, N. Y.—Consists of the vehicle, an electric motor embraced in a circuit energized from a suitable source, a motor dynamo or similar converting device, and a storage battery energized from the motor dynamo and adapted to actuate the latter and energize the motor circuit upon a cessation of the main supply.

No. 552,173.—FIELD'S ELECTRIC TELEPHONE.

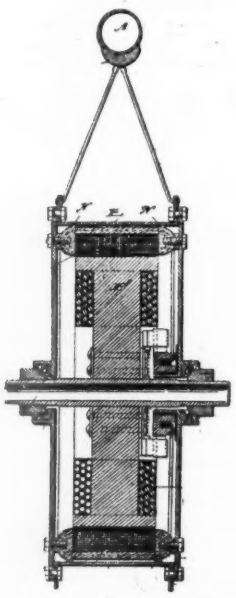
552,166 Electric thermostat and push button; O. F. Woodward, Le Roy, N. Y.

552,172 Electro-magnetic mechanism; S. D. Field, Stockbridge, Mass.—A system of compensating levers, comprising a pair of levers arranged substantially parallel and having abutting faces, one of said faces being curved and a support for one of the levers adapted to permit longitudinal movement thereof.

552,173 Electric telephone; S. D. Field, Stockbridge, Mass.—Consists of a diaphragm and a device adapted to vibrate therewith, a system of compensating levers interposed between the diaphragm and the said device and adapted to alter the ratio between vibrations of large amplitude and those of small amplitude.

552,181 Electrical railway signaling apparatus; H. J. Hovey, Evanston, Ill.

552,190 Electric arc light; L. B. Marks, New York, N. Y.—An arc lamp having a transparent or translucent inclosure around the arc provided with a small inlet for air and ducts for leading the air in a uniform direction relatively to the arc.



No. 552,271.—ELECTRICAL BICYCLE.

552,211 Depolarizer for primary batteries and method of making same; G. W. Thurnauer, Aurora, Ill.—A depolarizing plate consisting of copper oxide intermixed with copper chloride, the whole forming a compact, solid mass.

552,218 Electric battery; D. S. Williams, Philadelphia, Pa.—A cathode comprising a series of superposed cup-shaped receptacles, between pairs of which is supported the active material and yielding, conductive material connecting the cup-shaped receptacles.

552,219 Electrical battery; D. S. Williams, Philadelphia, Pa.—Consists of a cell or casing formed in two parts, and a cathode supported thereby and an anode located between the two parts of the casing situated in said cell.

552,220 Electric battery; D. S. Williams, Philadelphia, Pa.

552,239 Safety device for electric circuits; P. H. D'Unger, Chicago, Ill.—An electric circuit, a switch included therein, an induction coil whose primary includes a portion of said circuit, a body of explosive material connected with the switch, and the secondary circuit of said coil having its terminals in said explosive and adapted to fire the same.

552,260 Apparatus for transforming alternating currents into unidirectional currents; C. Pollak, Frankfort, Germany.

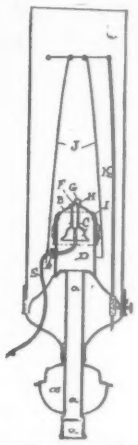
552,271 Electric bicycle; O. Bolton, Jr., Canton, Ohio.—An inclosing ring, to which the inner ends of the spokes are secured, combined with the side plates, which are secured to the ring at their outer edges, and which protect the operating parts from dust and dirt.

552,279 Electric signal for railways; E. B. Cutten, New York, N. Y.

552,312 Motor for bicycles; S. B. Battey, New York, N. Y.

552,313 Synchronous single-phase motor; C. E. L. Brown, Baden, Switzerland.

552,316 Electrical railway signaling system; T. B. Dixon, Henderson, Ky.



No. 552,384.—ELECTRIC GAS-LIGHTER.

552,322 Secondary battery; A. S. Krotz, Springfield, Ohio.—A holding material of porous asbestos fabric folded to form interior ridges, and an active material intimately united with said folded material and its ridges by compression.

552,337 Electric motor; A. W. Smith, Washington, D. C.—Consists of a fixed magnetic system wound with coils whose centers of mass are displaced forward in the direction of rotation from their geometrical centers.

552,338 Electrical rail-fish. V. Thelin, Geneva, Switzerland.

552,341 Electric smelting furnace; J. A. Vincent, Philadelphia, Pa.—Consists of a hearth with a vertical tube, a removable bottom thereto, an electrode arranged at the base or lower part of the hearth and removable with the removable bottom, and an upper electrode supported within the hearth at a distance above the first-mentioned electrode.

552,363 Insulating joint; E. D. Gleason, Brooklyn, N. Y.—Consists of two sections having perforated flanges secured together by a turned flange or ring and plugs of non-conducting material extending into the holes in the sections, and insulating material disposed suitably thereabout.

552,369 Means for operating railway vehicles; E. G. Hoffmann, Charlottenburg, Germany.

552,384 Electric gas lighter; P. Meyer, Alameda, Cal.—A Bunsen burner, having its surface of ignition enveloped by a mantle adapted to be rendered incandescent under heat, electrodes centrally disposed upon said ignition surface and suitable electrical connections for said electrodes.

552,397 Regulator for dynamos; C. E. Scribner, Chicago, Ill.

552,420 Signaling and lock-out apparatus for telephone stations; J. D. Clarke, Chicago, Ill.

552,425 Secondary battery; C. A. Faure, Paris, France.—Consists of a sheet of silicated asbestos fabric inclosed in a perforated envelope or cover of acid-resisting material.

552,431 Apparatus for registering the number of persons passing through gates; A. Gajardo, Valparaiso, Chile.

552,451 Electric railway; M. H. Smith, Halifax, England.—Consists of a main conductor, sectional surface bar conductors having extended pole pieces, and a magnetic switch comprising a pivoted lever carrying an armature for the pole pieces and carrying a contact piece for the main conductor.

552,465 Burglar-alarm attachment for railway cars; J. C. Bratton, St. Louis, Mo.

552,469 Double-diaphragm telephone transmitter; D. Drawbaugh, Eberly's Mill, Pa.

552,486 Car brake; A. B. Roney, Chicago, Ill.

552,495 Regulator for electrical circuits; J. C. Mayrhofer, New York, N. Y.—Consists of a resistance coil, a series of commutator plates connected at intervals with said coil, two contacts movable over said commutator, a worm shaft, and a lock for engaging and disengaging one of such contacts with said worm shaft.

552,496 Electric lighting system; J. C. Mayrhofer, New York, N. Y.

552,498 Electric-arc incandescent lamp; J. A. Mosher, Chicago, Ill.

552,501 Insulator; C. H. Snively, Mount Carmel, Pa.

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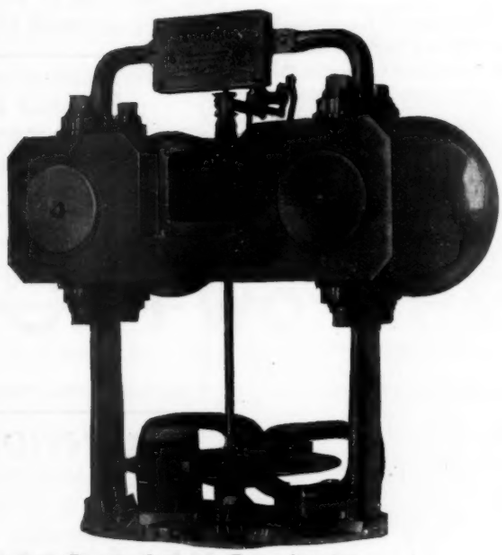
Tell-Tale Dial System for Electric Light and Power Stations.

In central stations and railway power stations using Thomson recording wattmeters to measure the total output from each machine, or upon each feeder, the grouping of the dials of all the meters in one place where they could be conveniently read at one time has been frequently urged as advantageous. The General Electric Company, has, therefore, brought out a tell-tale dial system. This permits the placing of all the dials upon one panel and the installation of the meters out of ordinary reach, as it is no longer necessary to read them each day.

The necessary wiring from the meters to the panel is simple and inexpensive. The panels can be duplicated and the performance of the meters be read either in the dynamo room or in the manager's office, or any other necessary place, and the performance of the station be accurately learned at any time. Each row of dials on the panel represents a single generator or feeder, and the recording indicator is actuated every kilowatt hour by a simple make-and-break device upon the meter measuring its circuit. The dials are several times larger than those on the ordinary meter, and they are all direct reading, all constants being eliminated by modifications of the actuating mechanism. It is only necessary in ordering the tell-tale dial to state the constant of each meter and the character of the generator; the panel can then be properly lettered.



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These meters are adapted for direct application to the switchboard, the studs supporting the meter passing through the board and the bus bars and forming the electrical connection. The conducting parts are of forged copper of the highest conductivity. The three sizes of these instruments, for either 100-volt or 500-volt circuits, are 2,500, 5,000 and 8,000 amperes.

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The Falkenau Engineering Company, Limited, of Philadelphia, have removed to a handsome suite of offices at 711 Reading Terminal Building, and have opened a stock room in the basement of the Reading Market, with entrances from Arch and Cuthbert streets.

Since the visit of President Clark, of the New Haven Railroad, and party to the works of the Westinghouse Electric Manufacturing Company, at East Pittsburgh, the electrical engineer of the New Haven road has been visiting the works, inspecting the Tesla motors for the operation of cars on standard railways.

Stanley & Patterson, 32 Frankfort street, New York city, have recently placed upon the market the "Vigilant" single-stroke electric bell, designed for use in railroad depots and factories, and for fire alarms as well as other purposes. The length of stroke and tension is adjustable, and the signals are perfectly distinct, no matter how rapidly they may be given. These bells are made from three inches in diameter up to 20 inches. The reception accorded to them by the trade and Stanley & Patterson's customers has been very favorable.

Death of Alfred E. Beach.

Alfred E. Beach, for 50 years active in the editorship of the *Scientific American*, died of pneumonia at his home in New York city on January 1. He leaves a widow, a son and a daughter.

Mr. Beach's father was Moses Y. Beach, who established and for many years conducted the New York *Sun*. Mr. Beach was born in 1826 in Springfield, Mass. After obtaining a thorough education at Monson, Mass., Academy, under the direction of the late Alfred Ely, D.D., he entered his father's office, where he acquired a practical knowledge of newspaper work. In 1846 he and his former schoolmate, Orson D. Munn, founded the firm of Munn & Company and became the proprietors of the *Scientific American*, which, at that time, was the only weekly journal of its kind published in this country. Mr. Beach was full of energy, and his natural love of mechanics and engineering led him to make several inventions of note. In 1852 he invented a typewriter very similar to those in use to-day. About 30 years ago he invented a pneumatic tube system for carrying mail matter and later he developed a pneumatic railway system. His best-known invention was the Beach hydraulic shield, used in tunnel construction. This device was successfully employed in building the St. Clair tunnel as well as those under London, Glasgow and the Hudson River.

Mr. Beach was well known for his private charities. He leaves a host of friends and acquaintances among inventors, engineers, and newspaper men, who will sincerely mourn his loss.

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To the Editor of Electrical Review:

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A. Messersmith.

Buffalo, N. Y., December 31.

Industries of Providence, R. I.

On December 21, 1895, the Providence, R. I., *Telegram* issued a special number in an illuminated cover, describing the manufacturing interests of the city. Among those whose plants were illustrated and described were the Rhode Island Tool Company, the American Electrical Works, the Union Railroad Company, the Narragansett Electric Lighting Company, the Providence Telephone Company and Armington & Sims Engine Company.

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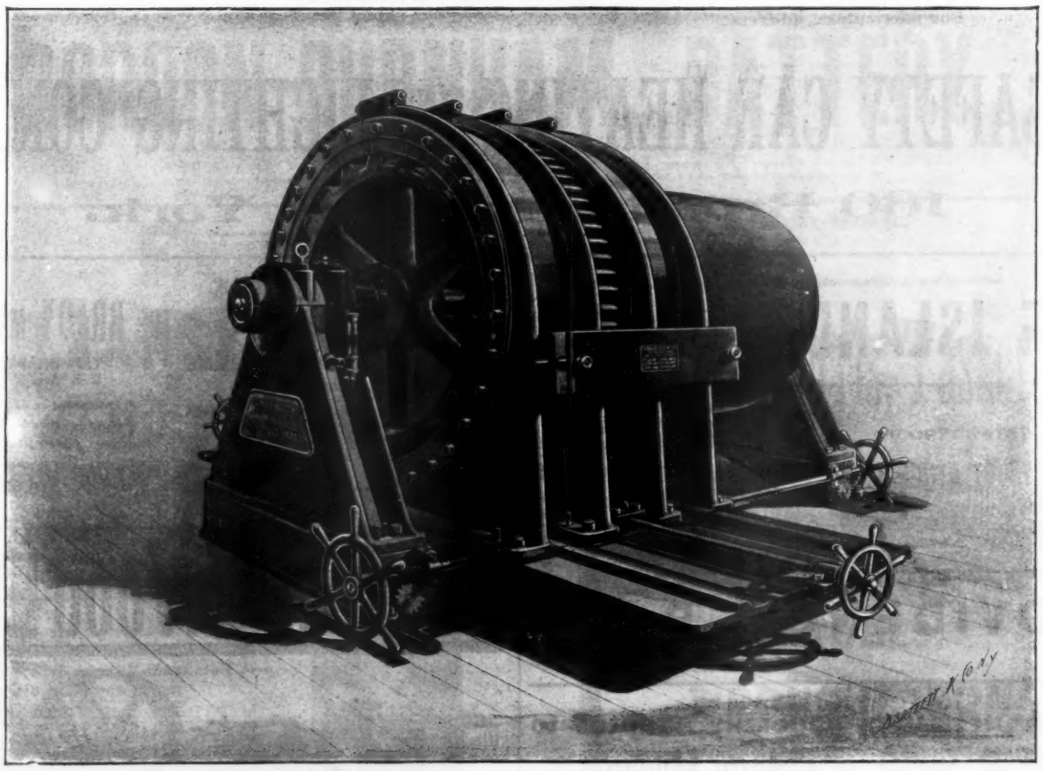

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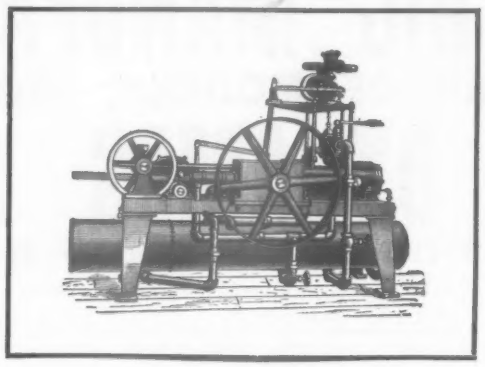

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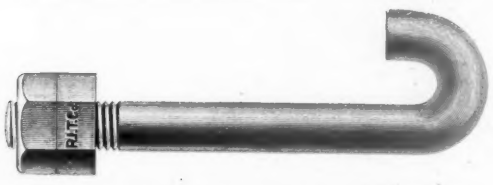

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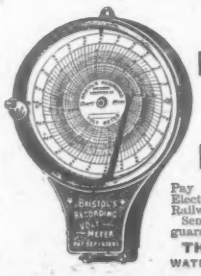

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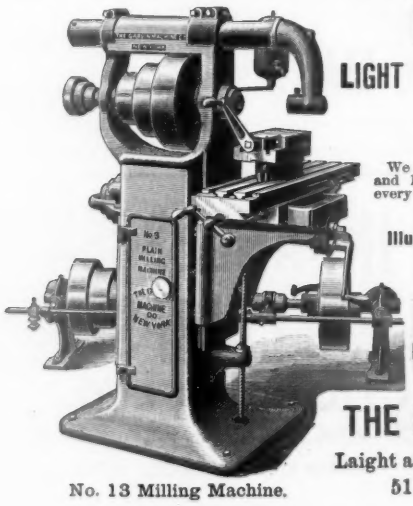

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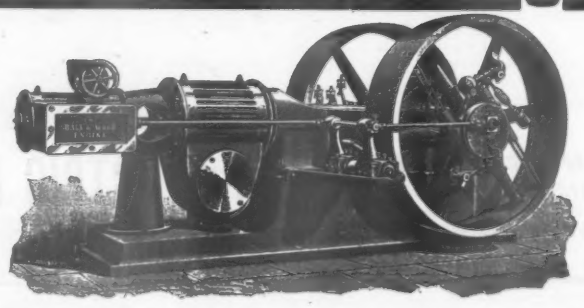

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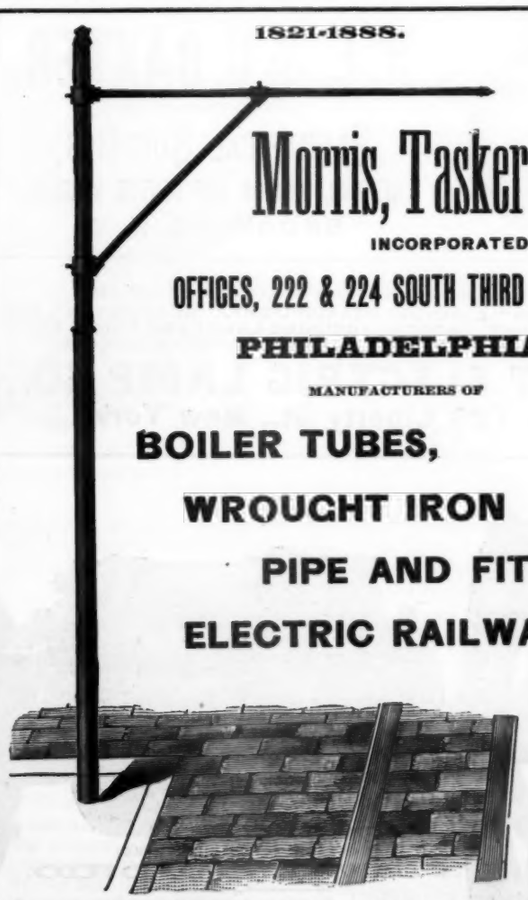

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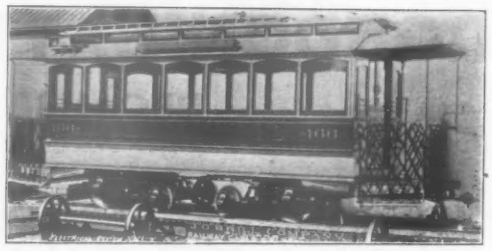

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